# THE IRON TRADE REVIEW

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## THE IRON TRADE REVIEW.

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CLEVELAND, O., MAY 14, 1891.


## THE WEEK IN IRON CIRCLES.

**General Features.** A noticeable picking up in business is to be observed in some directions. Two or three car works have taken orders since our last report, and are buying pig iron to cover. The agricultural machinery shops are driven to their fullest capacity. On the other hand, jobbing foundries, particularly those depending on railroad work, are very dull. Owing to the difficulty in placing municipal bonds for water works and other improvements, the large pipe shops are running very light. Retrenchment among the railroads is carried to a greater extent even than in the first months of the year. Cases are reported where strong roads have side-tracked miles of crippled cars, and in some cases even engines, rather than expend the money for necessary repairs. This leads to the belief that when the demand comes from that source, it will be with a rush, and well-informed iron men believe this will be soon after the July 1st statements. Turning to the pig iron market, an increase in Northern production is to be noted, but it is believed to be below the current rate of consumption, small as the latter is. In the South the full normal producing capacity is at work. The output in the Birmingham district is the largest in its history. At Louisville, several transactions involving a very large amount of iron are under negotiation, and will most probably be closed within the next two or three days, but there is yet considerable margin between the prices quoted and what the buyers feel willing to pay. There is no disposition on the part of furnaces to crowd iron on the market, on the other hand, believing that bottom has been reached, and that from now on the tendency will be decidedly upward, some of the furnaces are disposed to yard what surplus they make over requirements for regular orders, and hold it until later when they feel assured that buying will be heavy, as they are aware that stocks in consumers' hands are light. More inquiries for Lake Superior charcoal are noted at Detroit, but extended delivery is asked in most cases, and furnacemen do not want to accept present low prices for long deliveries. The Detroit market is not in as demoralized condition as reports would indicate in Chicago. Sellers prefer to hold their iron unless they can see their way clear to obtain cost for their product. Prices of Southern irons remain about the same as they have been for several weeks past. What orders are taken are at regular prices, and in most cases prompt delivery is requested. On account of the continued trouble in the Connellsville district, it is difficult for foundries to obtain as good quality as they are accustomed to use, and thus more demand is caused for silvery iron. Transactions in Lake Superior charcoal continue to be the most prominent feature of the Chicago market; many additional sales of round lots have been made, and other large consumers are now negotiating for their season's supply. Buying of metal of this class, which usually takes place in June and July, is being consummated nearly two months ahead of regular period, in consequence of the exceptionally low prices which are ruling. There has been no real upward tendency in price yet in this line. Transactions in the way of coke irons are diminishing somewhat, deals being very light for iron made in the Birmingham district. Sales of Northern irons have been restricted on account of the shutting down of most of the local furnaces, owing to the impossibility of obtaining fuel. Purchasing, at Buffalo, with the exception of Lake Superior charcoal iron, continues to be for immediate requirements. The malleable trade is beginning to manifest considerable interest in the market. Prices still remain very low. Consumers in the St. Louis market are beginning to realize that prices have about reached bottom, and inquiries are coming in more freely. The furnace companies, however, as intimated before, will not consider advanced deliveries at the present prices, and increased activity with higher figures may be anticipated shortly. At Cincinnati, prices have not improved any since last report, but there is a larger business. Inquiries have come in for large quantities of both coke and charcoal irons. Such transactions as have been closed have been at the bottom figures. The more active buying, however, affords a better foundation on which to build a market, and some furnaces have already advanced their views for forward deliveries. The largest orders booked have been for Lake Superior charcoal and Southern coke grey forge irons.

**The Local Situation.** As far as the case is at all applicable to the interests centered here and in the Mahoning and Shenango valleys, there has been no change in the situation, and the prospects for a change are as remote as ever they were. After making all the concessions that could possibly be made, the ore producers find that they are no better off than before, and that the volume of their business would not have been affected an iota if they had gone up with the price instead of coming down. That is to say, even the exceedingly low price made for '91 ore has been no inducement to the furnace interests to purchase, and the ore men are prepared to wait for something or other to turn up in betterment of their business. The ore prices have been reduced on the average a dollar and a quarter from last season's prices, the vessel men have followed suit, and no space need be wasted to say that there will be no money this year in lake freights. In evidence of this assertion it is only necessary to state that with the exception of some government work, and one private boat, the dockyards hereabouts are without work or orders, a condition of affairs that has not prevailed for many years. But the pig iron manufacturers are as far as ever from the solution of the vexatious situation, since with all the reductions in the way of ore and lake freights they are still unable to make iron advantageously, with coke at a dollar-ninety, and the railway freights as high as ever. Personal interviews with a score or more of furnacemen all bring out the result that while with the closest sort of figuring estimates might be produced showing that iron can be made at these figures without any loss, there can be no doubt of such loss when the incidental short-comings of the average furnace are considered, whereby the consumption of both ore and coke may be insensibly increased 10 per cent. or more for any given lot of iron, and which occurrence, regularly as it is recorded in the very best furnaces, would naturally wipe out any rosy figures that can be made with pencil and paper. All that can be said on this score is that with the prices now prevailing no furnaceman is justified in making iron; and the refusal, this week, by one of the largest furnace concerns, to enter into contract for the long-time delivery of a round lot of iron, at a slight advance over the going quotation, is significant in this respect. The coke producers upon whom, jointly with the railways, this situation is to be charged, are playing a magnificent game of bluff, which may or may not prove successful; certain it is, aside from any temporary advantage that may accrue to them, that they are surely killing the goose that laid the golden egg, and that every pound they are now adding to the burden which is overwhelming the furnace interests, will weigh a ton when the tables shall come to be turned upon the coke producers. If the reports from the coke country are at all to be believed—and they have been colored often enough to make such a doubt possible—there are now in blast one-fourth of the ovens in the coke region. In the meantime there is no demand for coke by any except the Pittsburgh and a few scattering furnaces, so that, these orders filled, the coke producers are liable to have ample leisure in which to study over the wants of their kindred trades, and to give to the furnace interests that consideration which seems to be called for at this time.

## TWO GREAT IRON-PRODUCING SECTIONS.

Here are two little tables, compiled from the Annual Report of American Iron and Steel Association, that will bear studying. They relate to the production of pig iron in 1889 and 1890. The first group constitutes what is properly the Central Western district and is as follows (net tons being used):

| | 1889. | 1890. |
|---|---|---|
| Western Pennsylvania | 2,371,632 | 2,716,965 |
| Ohio | 1,215,572 | 1,389,170 |
| West Virginia | 117,900 | 144,970 |
| Kentucky | 42,518 | 53,604 |
| Indiana | 9,839 | 16,398 |
| Michigan | 214,356 | 258,461 |
| Wisconsin | 158,634 | 246,237 |
| Missouri | 86,190 | 100,550 |
| | 4,216,661 | 4,926,355 |

The increase in 1890 over 1889 was 709,694 tons, or 17 per cent.

Below is a table showing the number of net tons produced in the Southern group:

| | 1889. | 1890. |
|---|---|---|
| Alabama | 791,425 | 914,940 |
| Tennessee | 294,655 | 299,741 |
| Georgia | 27,559 | 32 687 |
| Virginia | 251,356 | 327,912 |
| | 1,364,995 | 1,575,280 |

The increase in this case is 210,285 tons, or 13 per cent.

The above is taken by iron authorities as the natural classification of the two sections. If we make the division conform to State lines and add to the latter group the States of West Virginia, Kentucky, Maryland, Texas and North Carolina, we have a grand total of 1,953,459 tons in 1890, against 1,566,702 tons in 1889, an increase of 386,757 tons, or 24 per cent., over 1889, as compared with an increase of 38 per cent. in 1889 over 1888. Alabama showed an increase in 1890 over 1889 of 16 per cent., against 76 per cent. as between 1888 and 1889.

## TRAFFIC IN TRADE-MARKS.

Touch an English manufacturer on the subject of his trade-mark and you touch him on a tender spot. American manufacturers, who pay far less attention to such matters, can scarcely appreciate the sacredness with which this protecting symbol is regarded abroad. No one can blame a Sheffield manufacturer, for instance, for seeking to maintain the high reputation of his cutlery, but his efforts to enforce his rights sometimes bring unexpected results. Prior to the passage of the Merchandise Marks Act, the hue and cry was that German makers were stamping their goods with Sheffield trade-marks. But, nefarious as was this practice on the part of the German manufacturers, it was many times surpassed by certain Sheffield manufacturers who were discovered in the act of receiving German-made goods, affixing Sheffield trade-marks thereto, and shipping them back to the Continent. But the height of commercial depravity seems to have been reached in the recent revelation that certain English manufacturers have been engaged in the iniquitious task of stamping "good, honest Sheffield cutlery" with the name of a German manufacturer and at the same time affixing to "some rubbish made at Solingen or Remscheid" the Sheffield trade-mark. Thus the good and the bad article would both be shipped to neutral markets under false colors, and the natural result would be that the customer, choosing the better make, would turn to German rather than English manufacturers for his supplies. It must be admitted that commercial treason could not well go farther, and it is difficult to decide which to blame the worse, but, if possible, the English manufacturer would seem to be a little more steeped in dishonesty. After all, however, it is barely possible that too much stress is laid on trade-marks and not enough attention paid to pushing for foreign markets in advance of more wide-awake competitors.

## NO SENTIMENT ABOUT LAKE COMMERCE.

When Ashtabula first began to loom up as a dangerous rival of Cleveland as a receiving port of Lake Superior ore, the mere idea of such a possibility was ridiculed by those who imagined that the vessel trade of Cleveland was secure beyond any danger of impairment, and who were sure that the harbor of Clevelaud possessed advantages beyond those of any of her competitors. Since then, a great many things have occurred to produce the very result that was feared at the beginning of the discussion in this matter, and Cleveland is fast losing her vessel trade, as the figures for the current year will undoubtedly demonstrate.

Two principal reasons may here be cited for this result—the lack of proper berths for all manner of shipping, and the greater cost at this port for handling coal and ore over that accruing at other, similarly located ports. The government, at a very large cost, has caused to be built a harbor of refuge, and is now adding another breakwater for the better protection of the harbor, and the shipping that may seek shelter here. Instead of making proper use of these harbor facilities by the building of ample docks, the harbor of refuge has been generally used by pleasure craft, and so little regard was had for the great benefit given this port by the government, that the harbor was permitted to sand up, making it less possible year by year for deep-laden craft to anchor there. The condition of the river and dock spaces is too well known to vesselmen to require even a passing word of criticism.

There is at present in progress a strike among the dock men against a proposed reduction of wages. The cost of handling coal and ore at this port is admitted to be from twenty to thirty per cent. greater than that of other ports, and the result must necessarily be a reversion of this business to other ports unless Cleveland can meet her competitors. All the Lake Erie ports, as distributing points, stand in exactly the same relation toward the receiving stations, so that the latter are in no manner affected by the point of lake shipment. It matters nothing to Youngstown whether the ore received there is landed in Cleveland or in Ashtabula, the rail freights being the same; but if the cost of handling it in Cleveland, for the Youngstown market, is higher by thirty per cent. than it is via Ashtabula, there can be little doubt as to the result.

It costs no more to send coal by rail to Cleveland than it costs to ship it to Ashtabula, both being forwarding points to the Northwest. But the Pittsburgh shipper will not pay twenty per cent. more simply for the pleasure of having it forwarded from Cleveland.

These are statements of fact, and the application lies with those who are, or ought to be, directly interested in the matter. Yet no one need be surprised to see ports other than Ashtabula make still more serious inroads upon the lake trade of Cleveland.

## IRON ORE ON DOCK MAY 1st, 1891.

It is safe to say that nearly 2,400,000 gross tons of iron ore were on dock at Lake Erie ports May 1st, 1891. One year ago (May 1st, 1890) 936,228 tons were on dock at the same ports. The increase this year is nearly 1,500,000 tons, or about two and a half times last year's surplus, and nearly five times the amount on dock May 1st, 1889. The amount on dock at Lake Erie ports at the practical close of navigation last year (December 1, 1890) was 3,893,487, the above figures showing the Winter shipments from docks to furnaces to have been about 1,500,000 tons. Cleveland docks contained the largest accumulation of ore this Spring, viz.: 908,566 tons, against 257,205 tons a year ago. Ashtabula comes next with 789,433 tons, as compared with 344,486 tons May 1st, 1890. To any one not conversant with the course of the iron trade during the past six months the above showing might prove startling, but the facts stated have long since been known among and discounted by the trade and can, therefore, have no effect upon business. We hope to give the exact totals in next week's issue.

## MONEY AND BUSINESS.

Gratifying, indeed, must be the conclusions reached by the conservative *American Banker*, in its study of the financial situation, reproduced in another column. Despite the great outflow of gold—which, in this case, comes from the Treasury vaults, and not from the banks—everything betokens an early return current this way, and with a country of unbounded demands and resources, the prospects are good for smooth sailing in financial waters for some time to come. Our agricultural interests are growing in strength; manufacturing industries, with the exception of crude iron, are quite favorably situated, and the banking system is generally responding to the needs of business. There can be no doubt that the turn of the year, now near at hand, will witness several changes for the better in lines at present in a stagnant condition, and the last half of 1891 will quite meet the expectations of the optimistic prophets.

IT is the judgment of the Chattanooga (Tenn.) *Tradesman*, anent the question of cheap iron production, North and South that "the truth of the whole matter is that the South makes iron cheaper than the North and will continue to do so, simply and solely because it has more abundant resources lying in closer juxtaposition and all the natural conditions for iron production are far more favorable in the Southern States than elsewhere on this continent." "The proxmity," it adds, "of rich ores to fine coking coal and limestone explains the whole matter, and specious reasoning on economies, the wage question, etc., etc., are simply faint whistling to bolster up courage." Bad grammar aside, does the *Tradesman* really think that freights and wages will have nothing to do toward equalizing the present disparity in costs between the two sections?

## THE MONETARY SITUATION.

Except for the outflow of gold, which still continues, the monetary aspects of business would be almost wholly undisturbed. At this season of the financial year no abrupt or severe changes usually occur in the loan market; and an easy tidal flow of the monetary currents usually prevails till the activities of the Fall demand begin. Most of the ordinary causes of ease are developing at present; though more tardily than usual. The flow of currency now sets strongly towards New York and other financial centres, so that there is a more notable return of deposits into the banks. The interior exchanges are beginning to favor these new movements; and though the rates for discounts and loans show some sensitive fluctuations, still there is little serious anxiety as to any early monetary perturbation of special importance. The slight advance from time to time, in the rates for money is regarded as one of the conservative forces tending to relief. It not only checks undue speculative risks, but accelerates the return of currency and disengaged capital into the banks of the chief reserve centres. The crop prospects continue favorable in this financial point of view, and there have been some exports of securities, aiding to redress the adverse oscillations of the foreign exchanges.

In presence of these facts the public anxiety is chiefly devoted to the export of gold. If this outflow ceases, monetary ease is regarded as sure. If it continues, the opinions of our best authorities differ very widely as to the the probable results. One view is that if the bank reserves do not supply the gold for export, the money market will not suffer as formerly from the drain of the precious metals. The Treasury, under recent legislation, bears the whole force of the pressure from gold exportation which under our former laws was sustained by the banking system alone. Under the acts of May 26, 1882, and July 14, 1890, the Treasury reserves of gold are directly responsive to every demand for export. Our foreign creditors and arbitrage brokers are not slow to avail themselves of this privilege, which is enjoyed in no other commercial country. The small premium exacted for gold bars for export is no impediment in the way of the imperious demand for gold which is agitating the money markets of Europe. The inference deduced by these observers is that the gold shipments will probably go on, and will perhaps increase.

This is denied by some bankers of excellent opportunities for forecasting the future. They point to our present and prospective exports. In April the aggregates were favorable. Next month the effects of the wheat crop will begin to show themselves in the foreign exchanges. The new wheat will begin to move in July; and early in June, these coming shipments will begin to supply exchange. But even at present, as for the past year, our foreign balances have been so favorable that the recent gold shipments have been effected at a loss to the foreign bankers who have taken away these metallic reserves. For the year ending March 31, the total imports were $876 millions and the exports $926 millions, leaving an excess of exports of $49 65 millions. In the previous year the balance in favor of the United States was $129 91 millions, and in 1889, $32 33 millions. Taking the total of the last six years, the annual average of the imports was $767.94 millions and of the exports $816 65 millions. Hence for this whole period the yearly balance in favor of this country averaged $48 71 millions. With such facts in mind these bankers affirm, that without taking any account of the vast influx of European capital for investment in industrial enterprises and corporate securities, which was never larger in volume than it has been in the last few years, the foreign exchanges are now in a condition unfavorable to the continued export of gold. They tell us further, that if much more is taken, the reaction will be swift and more powerful. The gold will be shipped back to us all the sooner, if we should need it; and in any case ample supplies of gold will flow this way next autumn, whatever efforts may in the meantime be made by Germany, Russia, and other countries, to increase their metallic reserves.

With regard to the general public, the impression is gaining ground that as the United States is a large producer of gold, and as we have such large accumulations of gold and silver in the treasury, we can afford to send to Europe all that is likely to be wanted from this country to meet the present emergency, which in magnitude and danger surpasses any crisis that the financial world has encountered for many years past. On the whole there is no doubt that the credit of this country has of late received a very gratifying impulse at home and abroad from the prestige of these timely supplies of gold and silver that have been recently shipped to Europe. It is believed that the resulting flow of foreign capital into our mining, industrial, railroad and other corporate securities will develop a notable increase of the highest value to our national prosperity and productive growth.

Turning next to the more practical aspects of the money market, we find equally satisfactory evidence of the strength of the monetary situation. The clearings are showing more indications of improvement throughout the country and especially in the West, than at any time since the November. panic. The banking system continues to grow. The closing of a few banks from voluntary liquidation, insolvency and other causes is more than compensated by the creation of new banks all over the country. Comptroller Lacey reports 70 new National banks and 26 closed banks since the beginning of this year. The number of the National banks for May 4, is reported at 3,626. The new officers appointed since January 1, is 890, and the number of new reserve agents 524, of which 190 are in New York City. The growth of the non-National banks is not reported in detail. It is hoped that our bankers' associations will soon begin in each of the States to keep and to send out for publication these important stritistics. We find from Dr. Marsland's latest statistics of the whole banking system, that the total number of banks was reported at 12,615 on May 1, and that of these banks 9,210 have active correspondents in New York, and 3,313 have correspondents in Chicago.

With regard to the changes in the bank currency and in the government bonds held as security for it, the Comptroller of the Currency reports at the close of April, 1891, a net decrease in the outstanding National bank notes for the month, of $1,384,178. This was caused by the surrender of $1,847,918, and the issue of $284,610, to new banks, and of $179,140 to banks increasing their circulation. The bank notes now outstanding are reported at $170,-294,009, of which $44,323,054 are represented by lawful money deposited in the treasury, and $125,970,955 represented by $140.949,900 of United States bonds deposited with the treasurer as security. Of the bonds thus held $23 293,450 are 4½ per cent. bonds., and $110,001,450 are four per cent. bonds. The treasury also holds $3,603,000 of four-and a-halfs and $22,248,500 fours to secure public deposits.

The currency retirement here reported is small, amounting to $1,384 178. It is of no moment as a factor in the money market for two reasons: First, is is off-set by the issue of treasury notes of 1890, amounting to more than $4,000-000, and secondly, the retirement itself has ceased to produce any actual currency contraction, because by the law of July 14, 1890, section 6, the greenbacks deposited to redeem these notes are ordered to be paid out of the treasury as ordinary miscellaneous receipts. The prospects of monetary ease are increased by this and many other currency arrangements, the operations of which will be watched with much interest by the banks and the financial community.—[American Banker.

## NEARLY AS MANY ON STRIKE AS A YEAR AGO.

The first week in May this year will go on record as a particularly lively one in industrial lines, in spite of the fact that the number of industrial workers suspending work was disappointing to labor leaders. The reasons are obvious. Though the first day of the month witnessed nothing like the anticipated general strike of coal miners, there were, nevertheless, a number of scattered strikes in that line, not as a rule owing to the projection of the eight-hour demand, but rather to the pushing forward of local issues simultaneously at many points. The result was that fully 25,000 coal miners are reported as having suspended work May 1, either for fewer hours daily or the signing of new or old scales of wages. Among the larger strikes of miners are 10,000 Iowa coal workers, 5,000 in the Pittsburgh district, and a number of smaller ones in the coal regions of Indiana, Illinois, West Virginia and Ohio. With the exception of these the situation in the coal region is comparatively quiet. The Hocking Valley miners and operators in Ohio settled their differences without a strike, although the men suspended work on May 1, during the conference. This suspension of work on May 1, in fact, in several districts has occurred without strikes being declared at all, the day itself, in many instances, being observed as a sort of industrial holiday. This has in several instances been enormously ascribed to strikes, when in reality no strikes were declared.

In contrast with the quiet feeling in the coal trade is the disturbance in several branches of building trades, second only to that of May 1, last year, in number and extent of strikes for shorter hours. The number of strikers in building and kindred trades, added to the number of miners and miscellaneous employees out of work, gives a total only a little smaller than that reported by *Bradstreet's* for the first week in May a year ago. The total number of strikers in the first nine days of May, 1890, was about 54,000, largely made up of building trade employees. This year the total number of strikers is more than 49,000, more than one-half of whom are miners. Of building trades employees, carpenters, painters, hod-carriers, masons and others, there are reported striking so far this month over 12,500. In addition there are on strike architectural and structural ironworkers, housesmiths and others to the number of 5,500. Stone and granite cutters also very generally struck, no fewer than 2,000 being reported out. These figures, with about 1,700 cigar-makers and 2,500 miscellaneous workers, make up the remainder of the large total. The largest single strike other than in the coal trade is that of 4,000 housesmiths, so-called at New York and Brooklyn, for eight hours. This strike is looked upon as specially hurtful to the building trades as a whole, owing to the likelihood of sympathetic strikes, some of which have already occurred. Among large strikes of building hands are those of 3 000 at Pittsburgh, of 1,600 at Newark and 1,500 at St. Louis. The strike of 1,700 cigar-makers was confined to Chicago, and was for an advance in wages. About half the men have granted the advance. In the majority of building-trades strikes the outlook would seem to favor the employees. The general strike of lumber handlers announced to take place at New York, has not materialized, only 300 men in all being reported idle. Cincinnati has been notably free from labor troubles in the building trades, while the contrary is true in many small towns in Pennsylvania and Ohio, in which building-trades strikes are reported. Among the old strikes, that of the coke-workers, nominally hangs on, but is a practical failure.—[Bradstreet's.

### A Second Tunnel Under the Detroit.

The *Engineering Record* says that a "new Detroit river tunnel is a probability of the near future. The Michigan & Canada Tunnel Co. has been organized, supposedly in the interest of the Michigan Central Railroad Co., to build a double-track railway tunnel under the Detroit river, connecting Detroit, Mich., and Windsor, Ont. The tunnel will cross the river a short distance below the Michigan Central transfer ferry, and will open on the main line on the Detroit side of the river, about one mile back from the shore. The total length will be 12,033 feet, of which 2,100 feet will be an open cut on the Canada side and 1,500 feet an open cut on the Detroit side. The inclosed portion or tunnel proper will be 8 433 feet long. The tunnel will be lined with steel plates, inside of which will be five rings of brick and concrete. The outside diameter of the lining will be 31 feet ⅞-inch, and the inside diameter 27 feet. Preliminary work will begin at once. The material penetrated will be clay similar to that penetrated by the Port Huron tunnel. Until more complete surveys are made it cannot be determined what the method of excavation will be, but probably shields will be used similar to those used in excavating the Port Huron tunnel."

## CONDITION OF THE STOVE TRADE.

In his annual address before the National Association of Stove Manufacturers, in Philadelphia, last week, President D. M. Thomas said, among other things:

Prices of stoves have fallen since your first meeting from $136 per ton to $86 70, but margins have not fallen in like proportion. Then the most favorable margin possible, as exhibited by Mr. Perry's cost sheets, which, although perhaps inaccurate in particulars, yet were, on the whole, a fair computation, was $9.69 per ton, or 7 1-10 per cent. on the selling price. The average margin of last year was about the same percentage. Taking into account the difference between now and that time in the condition of the country, in the state of general business, in the cheapness of money and in the average rate of interest, a profit of seven per cent. on sales to-day is infinitely better than the same percentage then, for the rate of all increments has decreased where the investment is not subject to monopoly. There are but one or two classes of stoves at present sold below cost, and those quite unnecessarily, and only because the makers of a majority are not members of your association, nor of local associations, and will not avail themselves of the opportunities of co-operation.

An excess of capacity now exists in about the same ratio as it did in 1872, but it is not as dangerous as then, because of the greater intercommunication of stove men and the consequent greater facilities for adjusting the production to the demand, and because of the automatic regulation of a uniform cost system. Competition is just as strong, there is just as great a desire to operate foundries to their utmost capacity, there is just as much exertion made to capture trade as then, but the work of your institution has regulated that competition to a very great degree and adjusted it to a legitimate basis by the development of localized adjuncts. There is not a section of this whole country to-day, except the New England States and New York City, where there is not a local organization in a more or less fair working order, regulating the conditions of the distribution of stoves, and in the city of New York strenuous efforts are even now being put forth to associate the parties interested. As for the jealousy and suspicion which are on record as being so rampant, and which were occasionally so flagrantly vicious, while they have not entirely disappeared, while they never will entirely cease so long as human nature is human nature, unrestricted by Divine grace, yet they have been materially mitigated, and in a sense refined, by the obligations and amenities of personal intercourse.

The statistics of business are materially changed in some respects. The number of foundries now is 293, as against 214, a very small increase compared with the population, but the average size of foundries has increased, the product of each foundry being estimated at 1 374 tons, valued at $119,000, instead of 1,000 tons, valued at $136 730. The aggregate output of stoves now is 402 560 tons, instead of 214,000 tons. The value of the total production now is $34 900 000, as against $29,260,000 then. The average weight of iron used then in stoves per head of population per annum was $11\frac{1}{10}$ pounds; now it is $12\frac{9}{10}$ pounds. So that we have increased in the number of foundries, in the average capacity of each foundry, in the value of the total output of stoves, and in the output per head of population per annum. But the average production of stoves per head of population per annum now is but $54\frac{1}{10}$ cents, instead of $75\frac{8}{10}$ cents then; the price per ton realized now, notwithstanding the immense advance in quality and expense of decoration, averages but $86.70, instead of $136.73. Pig iron, then over $40, is now but $15. What a transition these figures evince! And, considering that the prices of stoves and of pig iron and other factors of cost were about the same in 1880 as in 1872, and that therefore that mighty transition has occurred within ten years, is there not reason to attribute the easy graduation of the change, and the rapid adjustment of manufacturers to it to something outside the ordinary scope of business, and what can that be but the circumspection and prevision induced and developed by this association.

I am gratified to be able to record the fact that trade in the interval since we met has been more satisfactory than for some year, notwithstanding the peril the country passed through because of the stringent money market, occasioned by the financial disturbances in Europe. Prices have been more firmly maintained; the volume of business has slightly increased; the nominal margins have not been larger, as a rule, but concessions have been fewer, in some localities certain innovations have been restrained, others abandoned; the lesson of the cost sheets has been accepted; lighter stocks have been carried; borrowings are smaller; credits shorter; so that the aggregate annual exhibit is much more favorable.

The outlook is highly propitious. Stocks in the hands of manufacturers are lighter than for many years. General wages average no less; indeed, have slightly increased in some branches. Prices of agricultural products have enhanced in a greater degree than the crops were short, and the farmer has more money to spend. The crop prospects are reported as satisfactory. Railroad building is not expected or probable to its average extent. A prominent railroad man is reported to have said that by the 1st of August every railroad locomotive and freight car would be needed, and this indicates a large volume of transportation, with a corresponding circulation of money. So that the purchasing power of the country appears to have appreciably increased, and with this, and the light stocks, we may expect that the output of stoves will be enlarged and the cost slightly lowered. If then stove founders will firmly maintain prices during the slack months, will carefully scrutinize the market so as to avoid overproduction, will observe the lesson of the cost sheet, will be conservative in terms and conditions of sale, it is not too much to expect that this and next year will prove the most profitable since 1881, providing always that Congress will abstain from disturbing the country by unwise currency measures.

There is nothing in the condition of general business that specially affects your particular branch of that business, or calls for comment or warning. Everything seems quietly moving on in a calm, placid, but constantly progressive and encouraging manner. European matters have so far affected us but slightly. Wars are predicted, and are not improbable. They may affect this country somewhat, but we are not unprepared.

## BRITISH SHIPBUILDING IN 1890.

All the berths of all the shipbuilding yards of the United Kingdom were fully occupied at the beginning of 1890. The capacity of the yards for turning out tonnage was greater than it had been at any period in the history of British shipbuilding. There was ground for believing that the tonnage launched during 1890 would, perhaps, exceed the output of any previous year, but the predictions of a year ago have not been verified; a slight decline rather than an advance has taken place.

The output of tonnage in 1889 aggregated 795 vessels measuring 1,326,240 tons, against 874 vessels measuring 1,276,127 tons in 1890, showing a falling off of 50,011 tons. But, although all the berths of all the yards were fully occupied at the beginning of last year, fresh orders were few and far between, especially during the first half of the year. Meanwhile the cost of production was daily increasing in every direction and department to an extent which absorbed a large proportion of the builders' profits, advanced the price of cargo tonnage, and discouraged judicious intending buyers. Moreover, labor troubles were threatening everywhere, strikes ensuing in some instances, while anxiety and unsteadiness pervaded the industry during the first half of 1890; but toward midsummer fresh orders again came, the berths were once more occupied, and the yards were kept well employed until towards the close of the year.

Although 1890 was a year of anxiety and frequent disappointments to ship owners and builders, it was one of the greatest shipbuilding years in the history of the industry, showing a tonnage launched represented by 874 vessels measuring 1,276,129 tons, coming within 50,011 tons of the aggregate launched in 1889, and showing an advance on the great shipbuilding year 1883, of 26,129 tons. The years 1883 and 1889 indicate the full sweep of the pendulum. The former year showed a tonnage launched of 1,250,000; then commenced the downward swing and in three years, or by 1886, the total annual output had declined to less than 500,000 tons, or, to be accurate, to 480,799 tons. The gradual yearly increase set in with nearly 100,000 tons in 1887, over 325,000 tons in 1888, and 425 553 tons in 1889, when the total output reached the unprecedented figures of 1,326,240 tons. As it was in 1883, so it will prove to have been in 1889; the tonnage launched during the latter year will mark the furthest point to prosperity that the shipbuilding industry shall enjoy for many years to come. The year just ended already indicates a falling off of 50,011 tons compared with 1889, and should the annual decline of 1891 approach 500,000 tons compared with 1890, I shall certainly not be surprised. The downward course of the industry will be hastened by the fact that freights have been for the last 12 months, and continue to be, unsatisfactory and unprofitable to such an extent that a vast amount of tonnage is already laid up for want of remunerative employment; second, that the price of coal and shipbuilding material continue as high as they were at the beginning of last year; third, that wages all round are equal to the rates prevailing in January, 1890. I conclude, therefore, that shipbuilders will not, during the next few months at all events, be in a position to make tempting offers to shipowners in the way of low prices, while the shipowners, in view of the wretched freights prevailing and prospective, will scarcely feel warranted in ordering new ships without some extraordinary inducements on the score of terms.

Indeed, everything seems to indicate that the decline of output during the current year, compared even with 1890, will prove serious to shipbuilding and auxiliary industries, as well as to a large army of artisans and laborers.

The advantage to be derived from large ships in speed and economy of working continues to influence shipowners in that direction, and the average size of ships has advanced extent at all the shipbuilding centers.

If British shipowners and the admiralty were both to adopt iron instead of wood as a shipbuilding material, they have not been slow in recognizing the superiority of steel over iron for the hulls of ships, and during the year under notice, no less than 97 per cent. of the total output of tonnage was built of steel, the remaining 3 per cent. representing iron ships and a few small wooden vessels.

The advantage of the triple-expansion over the compound engine is also generally admitted, and the triplex type is all but universally adopted. Engineers, indeed, are already complaining that shipowners are blind to their own interests in declining to adopt the quadruple engine. Mr. Wigham Richardson, president of the North Coast Institute of Engineers and Shipbuilders, said in his inaugural address that "there is no manner of doubt that a great economy must follow the adoption of four cylinders, and that they will come into use as soon as they can be arranged without undue complication, with a ready accessibility of parts, and without any great increase of weight or space; and I may say, parenthetically," continued Mr. Richardson, "that my friend and partner, Mr. John Tweedy, claims to have fulfilled all these conditions."—[Report by U. S. Consul Jones, of Cardiff.

### Failure of the Canadian Nail Trust.

The Canadian Nail Manufacturers' Association is reported by the Toronto *Hardware* to have come to an abrupt end. It was claimed by all the contracting parties but one that the latter had taken an unfair advantage of them, in booking orders abroad for large quantities of stock at reduced prices. *Hardware* suggests in regard to the style of the organization: "Instead of the system of proportions which any one could see was bound to lead to bickering sooner or later, the pooling system should have been adopted. Then no one could have had the slightest chance of getting ahead of his neighbor." Meanwhile the different makers have resumed active competition against one another with every prospect of a reduction in prices.

## LAKE SUPERIOR MINING NOTES

MARQUETTE RANGE.

A big find of iron ore is reported at the Anvil mine, but the exact extent of the discovery is not yet known.—[Iron Ore, Ishpeming.

Nearly all the mines in this city are sending ore to lake ports so as to make stockpile room. No sales amounting to anything have been made. The new time card of the Northwestern was issued yesterday, but few trains are moving as compared with other seasons.—[Iron Ore, Ishpeming.

At the Ashland the diamond drill has revealed the presence of a fine body of ore, much to the satisfaction of the management, who were greatly concerned regarding the condition of the bottom of the mine a few months ago; not that they doubted the property would prove all right as exploration was conducted, yet it is pleasant to have the ore in sight rather than in the prospective. In a flat hole toward the hanging, in No. 3 shaft, 68 feet of ore was cut, this being bored from the seventh level. In No. 4 shaft, a hole put in to the north from the same level found 30 feet of ore. At No. 6, the drill is in ore for a distance of 50 feet, and is still cutting ore, the hole being bored at an angle of 10°.—[Iron Ore, Ishpeming.

MENOMINEE RANGE.

The following relative to a promising iron property in the Crystal Fall district is gleaned from the Republic *Sun*: "A meeting of stockholders of the Inter Range Mining & Development Co. was held at the office in this city on Wednesday. Two directors were elected to fill vacancies caused by the death of John Maguire, and the removal of J. A. Kirkwood from the State. The new directors are Wm. H. Pascoe, Negaunee, and M. E. Gleason, Republic. After the stockholders' meeting adjourned, the directors held a meeting and resolved to assess the stock at five cents per share, payable on or before the 22nd day of May, 1891. This assessment is for the purpose of purchasing machinery to prosecute the work in a diligent manner. We understand that the Inter Range property is looking well. The shaft is down 45 feet in ore, and they have crosscutted 19 feet of good ore. Owing to the amount of water they had to contend with, active work has been suspended for two weeks, but as soon as the necessary machinery can be got in, the work will be prosecuted with greater rush than ever." From persons who have recently visited the property it is learned that the ore is of a very high grade and gives every evidence of being in a large body. Pump, boiler and other machinery has been ordered and no time will be lost in placing the new machinery in position. The Inter Range property is situated in the southeast quarter of the northeast quarter of section 4, 43-31, about three miles northeast from the Mansfield mine.—[Diamond Drill, Crystal Falls.

The Mastodon slackened up considerably in its working force, for the reason that its stock dock is full and that no more cars could be had. The company has sold 20,000 tons of ore and will commence sending forward just as soon as possible, when the working force will again be put on.—[Diamond Drill, Crystal Falls.

The May mine, which has been idle for some time, is being cleared of water preparatory to resuming mining operations. A new shaft is to be put down at a point south of the old shaft.—[Diamond Drill, Crystal Falls.

At the Chapin, A and A 1 are closed down, and the only ore that is being hoisted comes from B and C shafts and the amount aggregates about 1,000 tons per day. The sinking at D shaft is being carried on and has progressed as far as the 7th level.—[Menominee Range.

The daily output of ore at the Ludington mine has been decreased about 250 tons by the accident which occurred to the shaft house on April 25. However, by the time the new shaft is completed a large amount of ore will be broken on all the lower levels and under the new arrangement in hoisting they will soon catch up.—[Menominee Range.

The shipping season at the Pewabic mine was commenced on Saturday last and about 25 cars per day are being shipped to Escanaba. The entire product of the mine and a portion of the stock-pile goes to make up the daily shipment. The stock-pile contains 25,000 tons, which is not so bad for the Pewabic, and considering, too, the dullness of the season.—[Menominee Range.

On the 6th, matters at the Chapin were livened up considerably by the commencement of ore shipments to Escanaba. The product of the mine at the present time is about 1,000 tons per day, but the daily shipments to Escanaba will be 2,000 tons, and the remainder of this amount being taken from the stock-pile. To facilitate the loading of ore from the pile, the steam-shovel was placed in operation on Wednesday afternoon. The former shipments which were being made by rail will be continued as heretofore.—[Menominee Range.

## PROGRESS OF TINPLATE MANUFACTURE.

TO THE EDITOR OF THE IRON TRADE REVIEW:

Under the heading of "Tin Manufacturers' Meeting," in your issue of the 7th inst., you say that there are tinplate works in operation in this country, turning out 60,000 tons a year. This is a mistake, it should read that there are twelve works in "course of construction" whose combined capacity will be 60,000 tons per year. Tinplate will be made in this country soon, and in large quantities, but such statements as the above one, do the cause more harm than good, I fear.

Truly yours,

C. R. BRITTON, Secretary.

The Tinned Plate Manufacturers' Association.

Of course the statement that 60,000 tons of tinplate are being turned out per annum in the United States was an inadvertence, but we thank our correspondent for calling attention to the error. From other sources we learn the following additional particulars of the meeting: The general opinion was that every indication pointed to the production of 100,000 tons annually long before the limit of time named in the new tariff law. An important item of cost in the erection of a new complete tinplate plant is the outfit for rolling bars from which the sheets may be rolled for tinning. Such concerns as the Britton Rolling Mill Co. are equipped for every step in the production of tinplate, including the rolling of tinplate bars. Many other firms, it is believed, however, would be more interested in embarking in the new industry if bars could be obtained at a satisfactory price outside their mills. It is understood that Mr. Carnegie has expressed an interest in this matter, and it is not improbable that he may undertake the rolling of tinplate bars on a large scale, in case an agreement can be arrived at in regard to prices. It is pointed out that mills now engaged in rolling steel rails might, at slight cost for additional facilities, become prepared for rolling tinplate bars, and as the steel rail mills are not working on full time, the making of tinplate bars would be welcomed by them as adding needed orders for their works.

In connection with the question sometimes asked, where the American tinplate manufacturers expect to secure skilled labor for their works, one of gentlemen at the New York meeting stated that he had received, without advertising for any, 472 applications for work from Welshmen, who had learned the trade in their native country, and were anxious to return to it if tinplate works should be established here.

The editor of the Wheeling *Intelligencer* has received the following telegraphic dispatches concerning the development of the tinplate industry in this country from firms which are now making or are about to make tinplates. The dispatches are all dated April 28th. The St. Louis Stamping Co. says: "We are making 25 to 40 boxes daily, but by July 1st our new works will be ready with a daily output of 500 boxes." Norton Brothers, of Chicago, say: "We are busy making plates for our own use. We are buying black plates in Pittsburgh pending the completion of our own mills." The Britton Rolling Mill Co., of Cleveland, O, says: "We have all the machinery on the ground, and will commence putting it up next month. We will be ready to start in August or September."

## GOOD RESULTS FROM HIGH PRESSURES.

In view of the great interest which is now being taken in the subject of carrying high steam pressures for compound triple-expansion and quadruple-expansion engines, we call attention to the enclosed list of high-pressure boilers which have been put out by the Glasgow factory of the Babcock & Wilcox Co.:

| Name of Firm. | Testing Pressure. | No of boilers. | Total H. P. | Working Pressure. |
|---|---|---|---|---|
| John Dewrance & Co., engineers, London | 350 | 1 | 10 | 200 |
| Cie des Tramways du Departement du Nord, France | 330 | 2 | 135 | 230 |
| Pneumatic Pulverizing Co., London | 300 | 1 | 40 | 200 |
| E. Daire, Anselin & Co., soap manufacturers, St. Nicholas les Arras | 300 | 1 | 35 | 240 |
| The Cambrian Patent Fuel Co., Limited, Cardiff | 350 | 1 | 92 | 250 |
| The British Pneumatic Pulverizing Co., London, *2d order* | 300 | 1 | 40 | 200 |
| Cadbury Brothers, chocolate manufacturers, Birmingham | 300 | 1 | 93 | 200 |
| The Southwark & Vauxhall Water Co, Wandsworth, London | 300 | 4 | 336 | 200 |
| James K. Caird, manufacturer, Dundee | 360 | 2 | 272 | 180 |
| Cadbury Brothers, chocolate manufacturers, Birmingham, *2d order* | 250 | 1 | 93 | 200 |
| Compagnie des Tramways et Omnibus, Lyons, France | 340 | 2 | 90 | 240 |
| The London Electric Supply Corporation, Limited, Deptford | 300 | 6 | 1,500 | 200 |
| The London Electric Supply Corporation, Limited, Deptford | 300 | 6 | 1,500 | 200 |
| S. Z. de Ferranti, electrician, London | 260 | 1 | 85 | 200 |
| The London Electric Supply Corporation, Limited, Deptford, *3d order* | 300 | 1 | 93 | 200 |
| The Platt Lane Manufacturing Co., Hindley, Lancashire | 240 | 1 | 124 | 200 |
| Irene Brun & Co., manufacturers, St. Chamond, France | 325 | 1 | 92 | 225 |
| La Societe Francaise de Materiel Agricole, Vierzon, France | 250 | 1 | 63 | 175 |
| The London Electric Supply Corporation, Limited, Deptford, *4th order* | 300 | 6 | 1,500 | 200 |
| The London Electric Supply Corporation, Limited, Deptford, *5th order* | 300 | 6 | 1,500 | 200 |
| La Espana Industrial de Matias, Muntados, Barcelona | 270 | 4 | 480 | 180 |
| Sulzer Freres, engineers, Winterthur, Switzerland | 270 | 1 | 140 | 195 |
| Anthony Shaw, Son & Pamphilon, Pneumatic Pulverizing Co, Burslem, Staffordshire | 300 | 1 | 156 | 200 |
| La Cie des Tramways et Omnibus de Lyons, *2d order* | 330 | 1 | 70 | 228 |
| Tramways de la Seine, Courbevoie, France, *3d order* | 330 | 3 | 156 | 240 |
| Ellwell, Parker & Co., Limited, London | 300 | 1 | 120 | 200 |
| S. Z. de Ferranti, electrician, London, *2d order* | 300 | 1 | 120 | 200 |
| " " " " *3d order* | 300 | 1 | 120 | 200 |
| " " " " *4th order* | 300 | 1 | 120 | 200 |
| " " " " *5th order* | 300 | 1 | 120 | 200 |
| Alexander Friedmann, engineer, Vienna | 257 | 1 | 36 | 264 |
| Alexander Turnbull & Co., engineers, Bishopbriggs, Glasgow | 500 | 1 | 51 | 300 |
| The Electrical Construction Syndicate, Limited, London | 300 | 9 | 1,404 | 200 |
| S. Z. de Ferranti, electrician, London, *6th order* | 300 | 1 | 120 | 200 |
| " " " " *7th order* | 300 | 1 | 120 | 200 |
| Troller Freres, electrician, Lucerne, Switzerland | 270 | 1 | 244 | 180 |
| Taylor & Brooker, saw millers, Dorking, Surrey | 300 | 1 | 120 | 200 |
| Strohl, Schwartz & Co., La Croix-aux-Mines, Vosges, France | 315 | 1 | 172 | 240 |
| Brough, Cunningham & Co., manufacturers, Dundee | 300 | 1 | 175 | 200 |
| John M. Sumner & Co., merchants, Manchester | 300 | 1 | 140 | 200 |
| Cadbury Brothers, chocolate manufacturers, Birmingham, *3d order* | 250 | 1 | 192 | 205 |
| G. Luther, engineer, Braunschweig, Germany | 285 | 2 | 384 | 180 |
| Ontario School of Practical Science, Toronto, Canada | 300 | 1 | 52 | 200 |
| James Simpson & Co. Limited, engineers, Delhi, India | 300 | 2 | 212 | 180 |
| Boanefoy, Hyo & Co., candle manufacturers, Barcelona, Spain | 300 | 1 | 15 | 180 |
| Siemens & Haloke, electricians, Charlottenburg, Berlin | 240 | 3 | 660 | 180 |
| Ganz & Co., electricians, Buda Pesth, Hungary | 225 | 3 | 420 | 180 |
| John M. Sumner & Co., merchants, Manchester | 300 | 3 | 420 | 200 |

The pressures given in the last column are the daily working pressures—many of them 200 lbs. and over, and show that it is not only practicable but economical to carry such pressures, if the engine plant is designed properly. In this country, the Babcock & Wilcox Co. have put out a large number of boilers at equally high pressures, among which are those built for the Wood Vulcanizing Co., of New York City, which have been running at 235 lbs. daily pressure, for the last ten years. Another notable example is a battery of four 100 horse-power boilers, which have been recently erected at the Baldwin Locomotive Works, Philadelphia, to carry 225 lbs. daily pressure. A duplicate of one-half of this plant is now being erected for the Schenectady Locomotive Works, and there are a very large number of plants of our make of boiler in the country running very close to these pressures. The above data we obtain from the company direct, and the statements can, therefore, be fully relied on.

LONDON is having a miniature naval exhibition on an area of 15 acres, comprising a good-sized artificial lake. On the lake it is proposed to give each day a mimic battle between miniature ironclad men of war, including torpedo attacks, torpedo practice, submarine mining, fireworks, etc. All the large shipbuilders are represented. A lighthouse resembling solid stone is made of American expanded metal, covered with cement.

## SHIP CANAL PROJECTS IN THE CENTRAL WEST.

Always fully alive to the importance of the question of inland navigation, no paper has done more to bring before the public the facts and figures bearing on the problem than the Pittsburgh *Dispatch*. To the courtesy of that live and influential journal we are indebted for the use of the accompanying map, concerning which it prints the following important article of interest to all manufacturers and business men in this section:

Considering the immensity of our country, and referring more particularly to the regions of the interior embraced in the basin of the Mississippi, there are but few localities where ship canals are feasible, and fewer still where there is a traffic of the kind usually transported on canals in volume sufficient to warrant their construction. We are, therefore, in danger of witnessing a popular "craze" on the subject of ship canals, and in this connection it is proper enough to distinguish between ordinary canals and ship canals. An ordinary canal, such as those undertaken in this State and in Ohio in the first half of this century, had an available depth of only four feet of water, the locks being about 90 feet long by 12 to 15 feet wide, passing boats of 65 tons. The Union canal, of Pennsylvania, was in 1825 constructed with locks only 8½ feet wide by 70 feet long, passing boats of about 40 tons capacity, and a number of the early English canals were built of the same limited capacity.

We had a 65-ton boat canal in this State connecting the Ohio with Lake Erie (and, poorly built and insignificant as it was, it paid well up to the very day it was sold out to the railroads), and from Pittsburgh via the Allegheny and Kiskiminetas rivers to Johnstown, the Western Pennsylvania canal of the same size extended. At Johnstown it was connected by the Portage railroad with the Eastern division, extending down the Juniati from Hollidaysburg. There were similar canals in the valley of the Susquehanna, the Lehigh, the Schuylkill and elsewhere, but most of them were long ago sold by the State to the rival railroad corporations. In New York, however, where a different policy maintained, the Erie canal from Buffalo to Albany has, since its original construction in 1825, been twice enlarged, and it now passes boats of 250 tons capacity, its present available depth being seven feet. The Erie canal returned to the State revenues amounting to much more than its cost, and it has been finally made free, and it will doubtless be further enlarged in the near future, its value augmenting with the lapse of time and its proved success in cheapening transportation. It is the nearest approach to a modern canal which we have in the country, though far from being a ship canal. A canal cannot be properly designated a ship canal which will not accommodate at least the smaller vessels that can ply profitably upon the waters ofour great lakes—which vessels must have not less than nine to ten feetdraught.

With propositions looking to an increase of depth beyond ten feet there usually arises on any of the old canal routes a difficulty in regard to the water supply, particularly for the supply of their summit levels. As the commerce of the lakes has grown to vast proportions, far exceeding in volume our coastwise trade, both in number and in size of vessels, the business being done chiefly with steamers drawing from 12 to 16 feet, with capacity ranging from 1,200 to 2,500 tons, the difficulties have vastly increased in regard to water supply for canals of the requisite capacity for the passage of such vessels, and hence it is that the regions where modern ship canals are physically practicable are restricted to a very few localities.

A careful study of the rim, or dividing region, separating the waters of the Mississippi and the great lakes, will disclose the fact there are but two points where the natural conditions are favorable for the construction of large canals connecting them. One of these points is at Chicago, where it is comparatively easy work to make a canal draining the waters of Lake Michigan into the Illinois river. Unfortunately, it is more difficult to show that the commerce through it, even if constructed, would be very great, though no doubt it would be large. From the town of Hennepin, on the Illinois, by a series of locks of about 250 feet aggregate lift it is possible to cross from the river named to the Mississippi at Rock Island. This is the Hennepin canal proper—or annex of the Illinois and Lake Michigan canal project. Its advocates propose a steamboat rather than a ship canal, for it would be not to exceed nine feet in depth, although quite wide and of almost unlimited business capacity. Its western connections would be the Mississippi and the Missouri rivers, and it is thought that steamboats would annually gather up in the Northwest and take to Chicago 2,000,000 tons of agricultural produce. A great extent of country far to the north and far to the south of the western extremity of the canal would have to be gleaned to produced such a traffic. Congress has already made the first appropriation for this project.

The other point where it is possible to obtain practically an unlimited water supply for canals connecting the lakes and our interior rivers is the one now in the hands of the Pennsylvania Ship Canal Commission, whose report has been recently made and ordered to be printed by the Legislature, with the accompanying maps. The length of the proposed canal is only 130.4 miles, from Pittsburgh to Conneaut harbor on Lake Erie.

It has been proposed, heretofore, to connect the Ohio and Lake Erie by an

MAP SHOWING CANAL ROUTES CONNECTING THE INTERNAL RIVER SYSTEM.

enlargement of the Miami canal, extending from Cincinnati to Toledo and also via Wabash river to Toledo, and surveys of both routes were authorized by act of Congress in 1880. The act authorized surveys for canals of the size of the Erie canal, of New York, viz: seven feet depth with double locks 110x18 feet. Major John M. Wilson, United States engineer in charge of the surveys, estimated the cost of the Wabash canal enlargement from Toledo to Lafayette City, Ind., 216 miles, at $24,236,135 17. There were 54 double locks with a total lockage of 448 feet, the summit being 190 feet above Lake Erie, reached by 23 locks, leaving a descent of 258 feet, involving 31 double locks, to Lafayette as aforesaid. But as Lafayette is just about 200 feet above the Ohio at the mouth of the Wabash, and fully 250 miles distant, at least 25 locks and dams would have been required to extend a permanent seven-foot navigation to the Ohio, which would have brought the total cost to at least $35,000,000. The length of the Wabash route is fully 400 miles longer than the Beaver-Conneaut route between the lake and the Ohio river. It is not conceivable that a ship canal on such an indirect route would prove of any but local advantage. The principal articles of Ohio river commerce in great demand on the lakes are coke and coal, and this route leaves the river too low down to be of much benefit to such commodities, and but little iron ore trade could be expected in return.

The other route from Toledo was via the Miami river to Cincinnati for the same sized canal with double locks. The elevation of its summit above Lake Erie is 370 feet; descent from the summit to the Ohio, 512 feet; total aggregate lockage, 882 feet. The estimated cost was $28,557,173; its length is 238 miles. This is probably as large a canal as will ever be built to the lakes from Cincinnati, and experience demonstrates in France and in New York that railroad competition cannot destroy the utility of such sized canals.

Small canals have also been projected from the Ohio at Portsmouth to Lorain Harbor—west of Cleveland—a distance of 274 miles, and from Portsmouth one such canal, extending to Cleveland, 312 miles long, is still in existence. On the Lorain route, or cut-off, the lockage would have been about 1,069 feet, while on Cleveland route it is about 1,130 feet, as compared with 759.8 feet on the Beaver route, which route is considerably less than half that of any of those named, and it besides possesses advantages in regard to water supply possessed by no other save that from Chicago, while so far as prospective business is concerned, no rival project in the country can be compared with it.

Of the intermediate routes connecting the Ohio river with Lake Erie, reference may be made to the Muskingum river, which has been improved for navigation and recently "overhauled" by the United States Government from Marietta at its mouth via Zanesville to Dresden, 91 miles. A small class of river steamers ply upon this river to Zanesville, and at Dresden a connection is made with the Ohio canal before mentioned, extending from Portsmouth to Cleveland. There are 12 locks and dams upon the Muskingum. This route is more than 60 miles shorter than the route of the old canal from Portsmouth, and avoids the passage of the summit separating the waters of the Sciota and Muskingum southwest of Dresden crossed by the Portsmouth canal, though it still remains 150 miles longer than the Beaver-Conneaut route, between the Ohio and Lake Erie, and with much more lockage.

In 1846–7 a small canal was built from Wellsville via the Little Beaver river due west to the Sandy and down that stream to a connection with the Portsmouth and Cleveland canal. It was abandoned soon after construction. The Sandy and Beaver intermediate summit being deficient in a water supply will probably rule out this route to the lakes for all time.

There remains a possible rival to the Beaver-Conneaut route which should receive your readers' thoughtful attention. We refer now to the route from the Beaver river below New Castle via the Mahoning river and Warren Summit to Fairport harbor on Lake Erie. The report of the Pennsylvania Ship Canal Commission discusses its merits, and, although the summit near Warren is about 80 feet lower than that on the adopted route, the canal would be from 12 to 15 miles longer than the latter. The chief objection urged against it is the difficulty of supplying its summit level in volume sufficient for a ship canal by means of feeders, or conduits extending from within the limits of this State, a distance of 35 to 40 miles from Conneaut lake, one of the chief reservoirs proposed for the Beaver-Conneaut route, and from which it is distant about 12 miles. To do this on the Warren route would effectually drain the head waters of the Shenango, which would forbid, therefore, any branch canal from the mouth of the Mahoning up to the Shenango to New Castle, Sharon, Sharpsville, etc., in which places there are now 21 blast furnaces, numerous rolling mills, etc. Whereas, the Beaver-Shenango-Conneaut route leaves the waters intact for the supply of a branch canal to Youngstown, and which branch would undoubtedly be built.

Commercial reasons only of the gravest importance should weigh against the location of the proposed ship canal on the best route. But when these are so manifest as they are in this instance, and particularly when the lower summit involves a complicated system of water supply—one almost certain to meet with legal difficulties, there being many precedents for action for such diversion of waters—and, moreover, as its increased length fairly balances the time saved by a reduction of lockage, the Canal Commission felt compelled to pronounce against the Warren route. The natural capabilities of Conneaut harbor are also considered to be superior to those offered at Fairport.

Thus in a cursory manner we have glanced over all the territory where connecting canals have been proposed—or are at all practicable—and have shown that of them all two only, viz.; the Chicago and the Beaver-Conneaut route, combine commercial merits and feasibility in such a degree as to warrant construction upon ship canal proportions.

As designed, the canal from Pittsburgh to Lake Erie will have a bottom width of 100 feet, and at the surface 152 feet, and 15 feet depth of water. It will be provided with locks having an available length of 300 feet by 45 feet in width, being of the same length, but rather larger than the grand locks of the truly magnificent Welland Canal in Ontario, connecting Lakes Erie and Ontario by a series of 25 locks. A study of the appended table of distances and canal elevations, derived from the report of the commissioners, will disclose some interesting features regarding the proposed canal. Thus a steam barge, carrying, say 1,000 tons of coke, for instance, from the Monongahela river, destined for New Castle, when it reaches Davis Island dam, will, with one lift of six feet, pass into the canal and not encounter another lock for 23 miles, the river gradually falling away in its descent alongside, while this pool or level continues unbroken to New Brighton, where the canal enters the wide Beaver river. The supply of this level, therefore, will be maintained with Beaver waters, making an acceptable contribution to the low water flow over the shoals in the Ohio below Davis Island dam. To New Castle, 51.4 miles, there will be only eight lockages from Pittsburgh, and allowing 15 minutes' detention at each lock, which is more than would be required for so small a vessel, two hours' time would be lost. Allowing four miles an hour in the canal and seven miles in the Ohio and Beaver rivers for rate of progress, and allowing for time spent in locks, the steamer would reach New Castle in 11½ hours. Larger vessels drawing the allowable maximum depth of 14 feet would probably require an hour more to New Castle.

It will be observed that the summit level is 20 miles long, the water supply coming from Conneaut and Pymatuning lakes and from reservoirs to the east of the canal on heads of the Shenango, Watson's creek, Conneaut creek, etc. This long summit level is one of the most characteristic features of the project, for of itself such a level is a very effective reservoir in maintaining the equilibrium of depth about the summit. It is remarkable also because it becomes also a part of the route on air line distance. In fact, the entire route varies but little from an air line from Pittsburgh—for even the Ohio starts off from Pittsburgh as though destined for Lake Erie—in a Northwest course. Pittsburgh by this canal will be nearer in sailing distance to Duluth, Marquette and Chicago than is Buffalo. It will be observed on the map that via the Welland ship canal (15 feet deep) Pittsburgh coal vessels can reach Toronto and other ports on Lake Ontario almost as readily as they can the Northwestern cities.

TABLE OF ELEVATIONS AND CANAL DISTANCES.

| | Miles. | Elevation of Water in Canal, Feet Above Sea Level. | No. of Locks From Pittsburgh. |
|---|---|---|---|
| Pittsburgh | 0.0 | 699.29 | 0 |
| Rochester | 27.4 | 705.3 | 1 |
| New Brighton | 30.4 | 705 3 | 2 |
| Beaver Falls | 32.4 | 715.6 | 3 |
| Rock Point | 40.1 | 739 0 | 4 |
| Wampum | 42.9 | 755.0 | 5 |
| New Castle | 51.4 | 790.0 | 8 |
| Middlesex | 65.4 | 823.5 | 12 |
| Sharon | 72.4 | 856.5 | 14 |
| Sharpsville | 75.9 | 866.0 | 16 |
| Head of Shenango navigation | 79.6 | 876.0 | 17 |
| Transfer | 81.9 | 976.0 | 22 |
| Greenville | 86.7 | 984.0 | 23 |
| South End of Summit | 98.5 | 1016 0 | 25 |
| North End of Summit | 118 5 | 1016.0 | 26 |
| Conneaut Harbor | 130.4 | 572.89 | 51 |

A feature of great practical importance in connection with this grand project is the fact that of the total 130 4 miles, four miles upon the Ohio and 52.2 miles upon the Beaver and Shenango has already been practically excavated by nature, and that only 74.2 miles of full canal construction is required. At only one point is it proposed to excavate as much as 20 feet above water surface, and by far the greater portion of the excavation can be accomplished by dredging and excavating machines.

## Varieties of Tap-Cinder.

This subject, which is of much importance to iron manufacturers, has received attention at the hands of Mr. Thomas Turner, the well-known lecturer on metallurgy, at Mason College, Birmingham, and he has presented a first abstract of the results of his tests to the South Staffordshire Institute of Iron and Steel Works Managers. For his experiments Mr. Turner obtained samples of boilings and tappings, both taken from the same heat, from various works during ordinary working with different irons. The samples were broken up passed through seives, being examined by eye, and with a moderately powerful magnet for globules of iron. It was found that all the boilings yielded globules of metallic iron, while none were met with in any of the tappings. The boilings yielded as much as 16 per cent. of metallic iron—hence such a slag would mean a preventable loss of 3½ per cent. of puddled bar, or equal to £2,500 a year on 300 tons of puddled iron per week. All the tests showed that the boilings were distinctly more impure than the tappings, and the analyses made by Mr. Turner show that for economical puddling it is necessary to boil away a considerable quantity of the first impure cinder so as to be able to obtain a pure tapping cinder with the use of the smallest possible quantity of fettling. As Mr. Turner truly remarks, tap-cinder is a waste product, and it is of importance that it should be small in quantity and highly charged with impurities. We hope that Mr. Turner will pursue this very important subject yet further, and give the Staffordshire ironmasters the benefit of his fuller experiments.—[London Ironmonger.

## Power Drills in a Hartz Mine

At the St. Andreasberg silver mines in the Hartz, rock drills worked by compressed air have recently been introduced, says *Industries*. The air compressor is placed underground, and is driven by a Girard turbine. The special point of interest in connection with this installation is the regulator, which consists of an air reservoir hewn in the solid rock. By the employment of power drills, it is found that in driving levels there is a saving in cost of 58.2 per cent. while 40.4 times as much work is done as that accomplished by manual labor. The cost of stoping by hand was $4.00, as compared with $2.12½ by machine, per cubic meter of ore won. In the case of shaft sinking, the cost with machine, inclusive of explosives, was $19 50 per running meter, as compared with $36 50 with manual labor.

## THE HARTMAN INSIDE SLIDING WINDOW BLIND.

The accompanying engravings represent various details of a very neat and practical inside sliding blind, which many of our readers will be interested in studying. The device, after a critical examination, we find to be a highly meritorious one. In the Hartman blind, the inventor has succeeded in devising a sliding blind which can be readily attached to the ordinary window frame, and readily removed therefrom. The blind slides in the window-frame, and remains in any desired position, being held in place by means of steel springs concealed from view.

Fig. 1 exhibits the appearance of the blind in use. They are made in three or more parts or sections, each moved independently of the other, and according to the size of the window to be furnished, in two, three, or four panels in width. The sliding feature of these blinds has obvious advantages over the old form of hinged blinds, in that it avoids the unpleasant rattling which most of us are familiar with, and the tangling with the curtains, while it does not interfere with plants or flowers on the window sills. The claim is made for them also, that they are much less liable than the old style blinds to get out of order, and that they will in consequence wear twice as long. As above noted, they have also the advantage that they can be readily adjusted to any window frame in an hour by any mechanic, and taken out and replaced in a moment.

In brief, they are affirmed to possess the style, beauty, the appearance of the old style inside blinds, without having their inconveniences. Where the window frame admits of it the blind guides are carried entirely down to the floor, so that when desired the blinds can be moved down and neatly stored out of the way below the window sashes, and either in front of the panel back, as shown in Fig. 2, or behind it, as shown in Figs. 3 and 4, which represents the blinds thus neatly stored away in a pocket, with panel back in front of the blinds, and the patent adjusted sill or lid to close up the pocket, as illustrated in Fig. 3, see dotted lines. Further, the blinds in no way interfere with the simultaneous use of the ordinary window roller shade, which may either be neatly adjusted between the sashes and the blinds, or if so preferred, entirely inside the blinds. It is obvious that quite a variety of plans may be made use of in the mode of attachment of the blinds to the window frames.

Fig. 3 is a sectional view showing the details for one plan of arrangement. In this sketch the front part of the window sill is made stationary, and the back portion is hinged to operate as a lid over the pocket, as shown by the dotted lines.

Fig 4 represents a front elevation of window blind, with the sections partly lowered into the pocket, and can all be stored away below the Hartman patent window stool entirely out of sight, as shown in Fig. 3.

By reference to Fig. 5 it will be readily seen that it is by no means necessary to always run the blinds down to the floor, or into pockets, as they can as well stop on the window stool of any ordinary window frame, in an old, as well as a new house. The cut represents the blinds put up the full height of the window, with the lower section resting on the window stool, and without pockets. This is a popular way to use them. See also Fig. 7 which represents them without pockets.

Fig. 6 represents one of the many ways of constructing a window frame

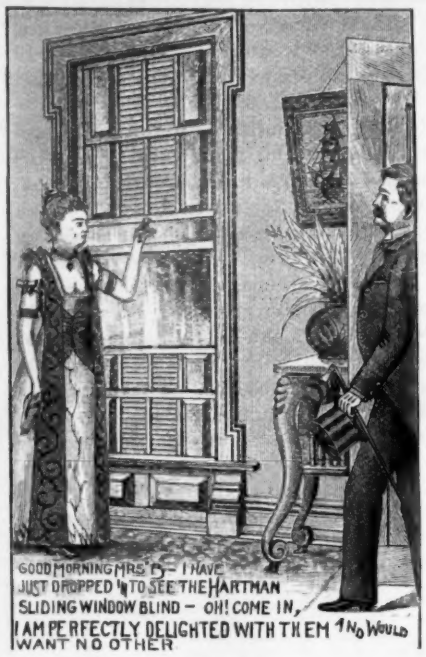

GOOD MORNING MRS. C— I HAVE JUST DROPPED IN TO SEE THE HARTMAN SLIDING WINDOW BLIND — OH! COME IN, I AM PERFECTLY DELIGHTED WITH THEM I NO WOULD WANT NO OTHER

FIG. 1.

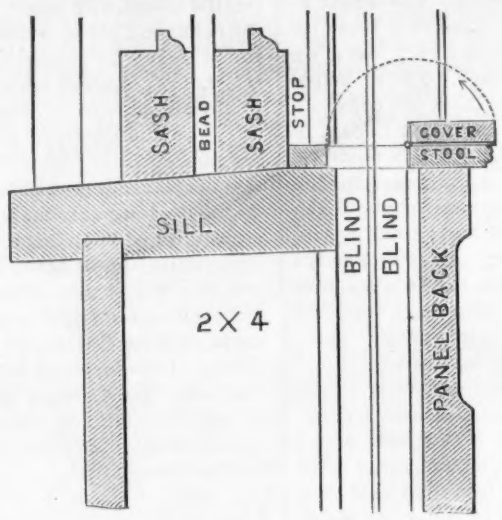



FIG. 3.

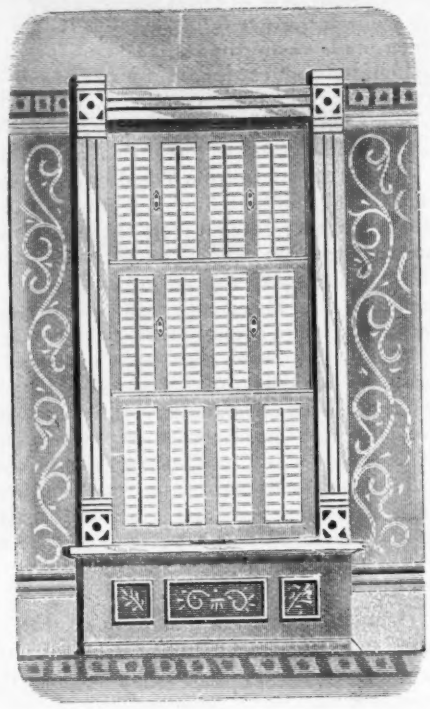


FIG. 5.

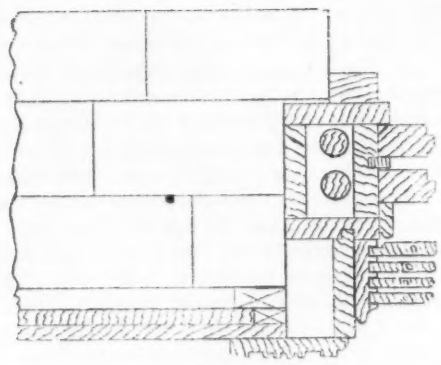


FIG. 6.

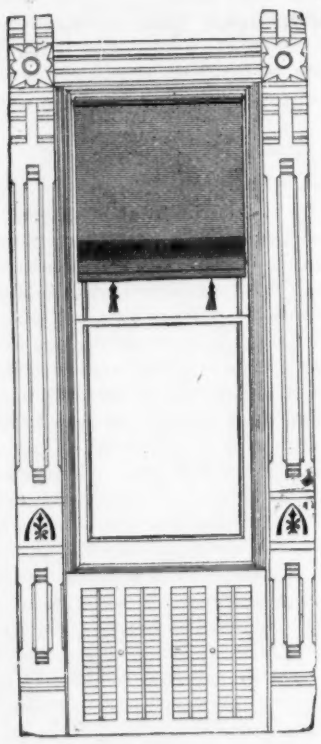


FIG. 2.

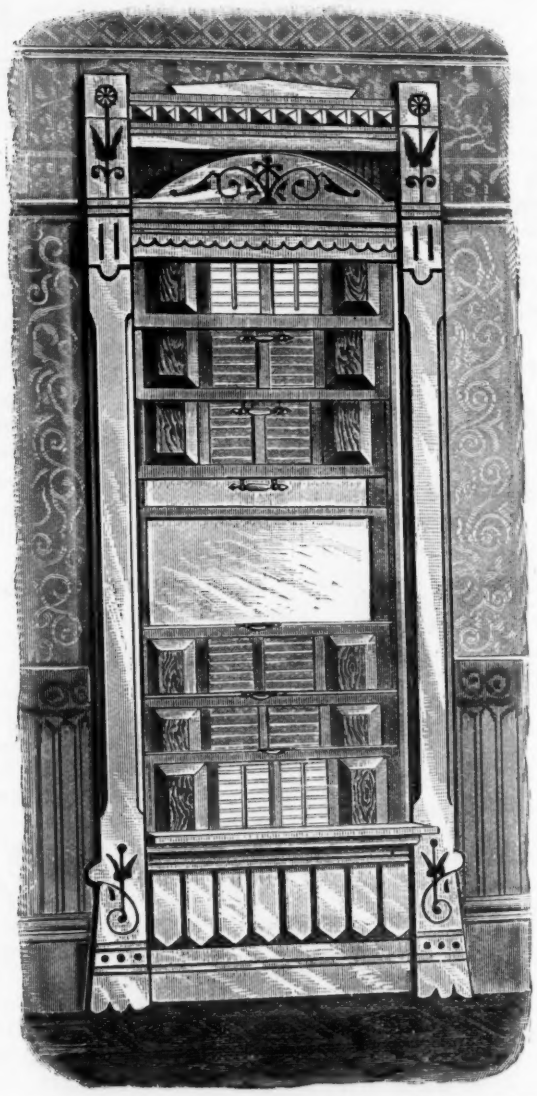


FIG. 4.—THE HARTMAN INSIDE SLIDING WINDOW BLIND.

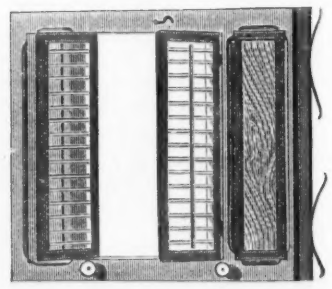


FIG. 7.

for the use of this blind, when frames are made new, showing location of guideway for the blinds, so set back on a sub jamb, as not to interfere with the taking out of the sash, and thus retaining the usual sash stop in the proper place. It is, however, not necessary to construct special window frames for the reception of these blinds, as they can readily be placed in any ordinary frame, as the guideway can easily be attached to the jambs inside the sash, and the blinds fitted to slide in them.

Fig. 7 represents a perspective view of the novelty style of blinds. The "Novelty" is a modification of the blinds, which has certain conveniences, and may often be preferred to the common styles before described. In this modification the blind section is made in the usual manner but the inside divisions of the section are made to swing on hinges, so as to open and shut at pleasure. The section slides up and down in connection with the other sections of which it constitutes a part. This swinging may be applied to any of the other styles of blinds if desired.

To remove the blinds from the window frames, it is only necessary to press each section sidewise against the springs, flattening them far enough to enable the stile on the other side of the section to pass out of the groove on that side, when the section is easily withdrawn; by reversing the operation, the section is replaced.

These blinds are made strong and durable, with mortise and tenon joints, and the makers claim that in these respects they will stand rougher usage than the usual hinged blind; while their construction and mode of operation render them less liable to derangement than the usual form.

We are informed the Hartman blinds are no more an experiment. Tens of thousands are in use, and are therefore well established, and it is only a question of a few years time until they supersede the old, clumsy and inconvenient swinging blinds altogether. Architects and builders all over the country are specifying the Hartman blind. It may not be amiss to mention that the makers provide a fly screen to be used in connection with their blinds. This is made of the best wire cloth, and either plain or ornamental, as may be desired, and constitutes substantially a fourth section. Besides preventing the ingress of insect pests, it provides an agreeable ventilation.

Each set of these blinds is furnished with a patent burglar-proof lock attached free of charge. This alone is an item of no small magnitude. In these times of house-breaking, it may save the owner many times the cost of the blinds, and perhaps life also. This is a patent device, and the Hartman blind alone has the right to use it. The manufacturers have hundreds of the highest testimonials from architects and builders having the blinds in use.

It will be seen from the foregoing description in connection with the accompanying illustrations, that the Hartman sliding blind is extremely simple in its mechanical details, neat and tasteful in appearance, exceedingly convenient in respect to use, adjustment, removal and replacement, equally well adapted to public and private service, and from its construction and mode of operation, not liable to become disarranged or injured. We commend it to the favorable consideration of the fraternity of architects and builders as a meritorious device.

We are informed these blinds are well protected by patents. Six patents have already been issued by the United States Patent Office, and two more applications are yet pending for valuable improvements, and when all complete will, it is claimed, be the best protected blind patent, as well as the best blind in the country.

These blinds have lately been adopted by the architect and projectors of the fine "Corcoran Hotel," now being erected in Washington, D. C.

The manufacturers are Hartman & Durstine, Wooster, O., who will furnish, if four cents postage is enclosed, with one of their new 80-page illustrated catalogues, giving full particulars.

## A GREAT OPPORTUNITY FOR THE NORTHERN MANUFACTURERS.

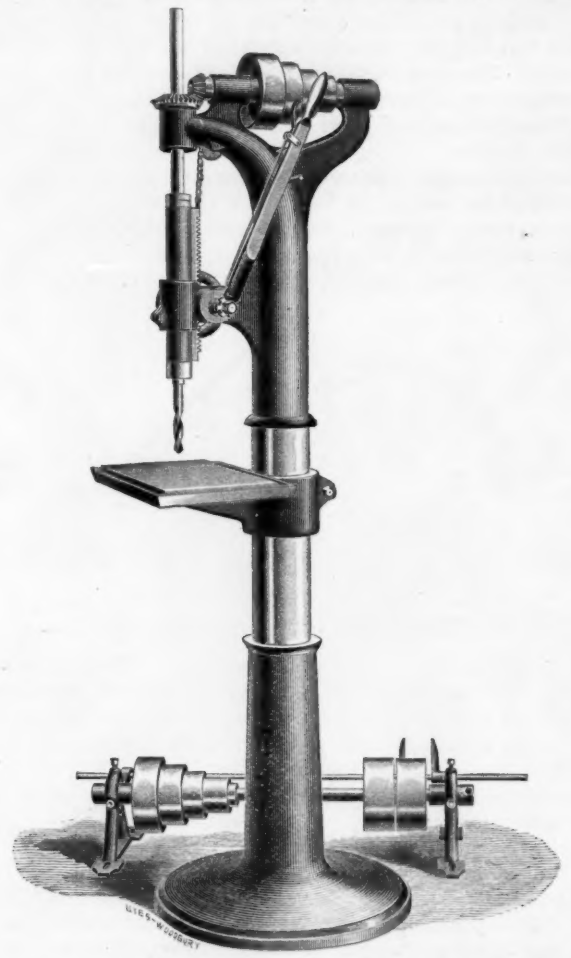
The permanent exhibition of Southern products, to be held at Raleigh, N. C., in which Northern industries are also expected to largely appear, presents opportunity to the Northern manufacturer in all his manifold branches of work that will not be neglected; or, if there should appear any probability that it might be, the Northern manufacturers' journals should be unceasing in their effort to call attention to it. The South, in regard to the fabrication of labor-saving machinery, confesses very candidly to an inferiority to the North, because of want of skill from lack of experience, from want of that mechanical genius which seems to be intuitive in the Northern brain, and perhaps want of confidence in the investment of capital in untried and unaccustomed lines; therefore, the South is ready to learn, and for a long time to come, of Northern hands the fabrication of the machinery for the farm and the workshop which Northern genius has devised and Northern skill perfected.

Particularly is this admission made by the Southern farmer. His experience with labor-saving machinery is satisfactory. Largely through its use he has spared himself the burden of much of the old-time manual labor. He has been enabled to conduct his work with more completeness, skill and facility; he has been able to expedite the harvesting and securing of his crops, and he has been enabled largely to expand the area of his crops, and he has prospered, he has grown rich, more than any other agricultural class in the whole United States. He is free from debt and unburdened by the curse of mortgage; he is encouraged, and wants to spend more money on those things which have so favored his prosperity, and as he has the money he will continue to be a prompt and liberal customer to the Northern manufacturer of labor-saving machinery of whatever kind, and the Northern manufacturer will have left to him the undisputed field of supply. There will, in relation to certain avocations, continue to be a union of Southern raw material, and the Northern working implements, the fruit of Northern inventive genius, skill and perfected experience.

The management of the Southern Exposition appreciate the fact that machinery must be made at the North, and that it not only admits, but earnestly and cordially invites the display in the buildings and on the grounds, all classes of manufactured fabrics, including machinery, and from the Northern factories, mills and shops, regarding such Northern material as evidence of mutual interest and purpose to co-operate for mutual benefit. The South will not be benefited more than will be the North, which will find a continually expanding field for its enterprises, and a greatly enlarged and permanent market for its fabrics.

## NEW SEMI-SENSITIVE DRILL.

The cut herewith shown represents a new semi-sensitive drill, which is especially adapted to all light work, and as a limit can be used up to and including ⅝-inch drills. The table is 11 inches wide, 14 inches long, and swings around the column. The table has a vertical adjustment of 12 inches. The distance from post to center of spindle is 6¼ inches. The spindle has a vertical traverse of 10 inches, and the feed is operated by a rack and pinion. The diameter of column is 4½ inches. Diameter of the spindle is 1 1/16-inch. Diameter of sleeve on spindle is 1⅞ inches. The diameter of cone pulleys are



3, 4, 5 and 6 inches. Width of cone for 2-inch belt. Driving pulleys 6 inches with 2¼-inch face. The machine is driven by a rawhide pinion mashing into a bevel, having an advantage of from 20 to 30. Distance from end of spindle to table 20 inches. Distance from end of spindle to base 4 feet. Hole in spindle fitted to Morse taper No. 2. Drill is provided with countershaft. Tight and loose pulleys 6 inches in diameter and should make 325 revolutions. Weight of drill 350 pounds. This drill is accurate and well made, and is a first-class tool for all work from ⅛ to ½-inch, and can be used on lighter as well as heavier work. For further particulars, address the manufacturer, W. P. Davis, Rochester, N. Y.

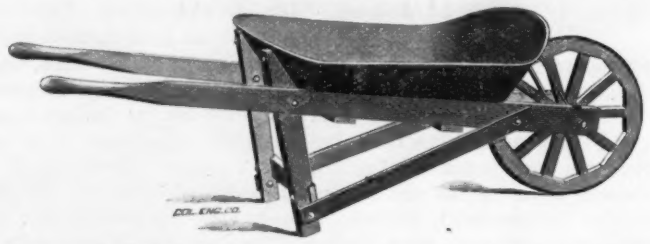
### American Coal in Germany.

The *Rhenish-Westphalische Zeitung*, the organ of the colliery owners in the Rhenish and Westphalian districts, expresses a very candid opinion regarding the import of American coal into Germany. It states: "American coal, which is used by the large steamship companies in Philadelphia and Baltimore, is exceedingly good fuel for boiler-heating purposes, and experience up to the present shows that it is superior to Westphalian coal. The large export trade in German sugar to America and the lack of return freight will permit of American coal being brought over so as to seriously compete with German producers." The same paper goes on to say that if Westphalian coal-owners do not look after their prices, American coal will become more extensively used in Germany. As an instance it cites the case of the import of petroleum, and concludes that the import of American coal deserves the serious consideration of German colliery owners.

THERE has been inaugurated in Brussels an international bureau for the publication of the customs' tariffs of all countries. The bureau is supported by English, French, German, Belgian and other governments, and it is expected that it will render great service to the commercial world. The foreign Department of Belgium has been entrusted with the organization of the institution. Probably the most important feature of the bureau will be the publication once, or several times, monthly of an international customs' bulletin, printed in the English, German, French, Spanish and Italian languages, and containing the customs' tariffs of the world, and other information.

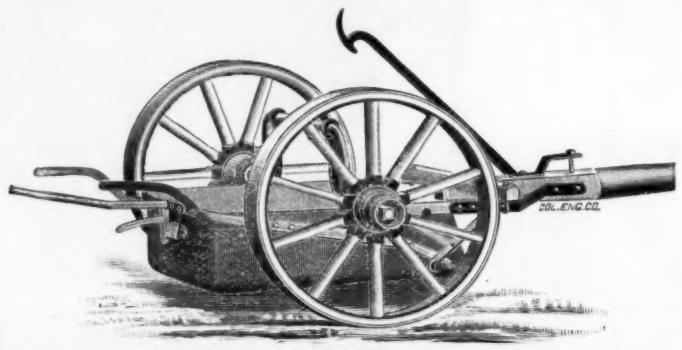
## NEW STEEL-TRAY BARROW AND WHEEL SCRAPER.

The accompanying cut represents a new article of manufacture, made by the Kilbourne & Jacobs Manufacturing Co., of Columbus. Heretofore, wheelbarrows have always been made with wooden trays. This was found to be objectionable, especially in shipments to foreign countries, and in fact, in shipments to parts of this country where they are subjected to hot and dry climates which very soon causes trays to warp and go to pieces. These steel



tray barrows were first made by the above parties exclusively for export, but they are now made in such large quantities that the prices approximate those of the wooden barrows, and, consequently, they are coming into use largely in this country. The tray is made from steel stamped into shape, with the outer edge bound over a heavy steel rod, which materially strengthens and stiffens it. These barrows will wear from two to three times as long as the regular wooden barrow.

The other illustration represents a new style of wheel scraper that has just been put upon the market by the above people, and on account of the patent device for operating same, the new patent dumping hooks and other features, is claimed to be far superior to any wheel scraper ever heretofore made. The cut represents one with a capacity of 10 cubic feet level full, but



they are also made to carry 12, 13, 16 and 17 cubic feet. To any of these scrapers can be attached their new patent end gate, whichis simple in construction, automaticin action, and will save from three to four feet upon every load. It has been said by contractors that in certain kinds of material the end gate accomplishes quite as much in moving earth as the scraper itself. The above goods are made and guaranteed to be first-class in material and workmanship, and thoroughly substantial in every way.

### Progress of the Tack Combination.

The Atlas Tack Corporation, described in recent issues of *Hardware*, has been formally incorporated at the office of the Secretary of State of Massachusetts, the amount of capital named being $700,000. The incorporators are Henry Hobart, John H. Parks, Thomas J. Lothrop, Cyrus D. Hart, Joseph Pettee, Jr, Cordelia D. Whidden, James F. Hobart, Amelia Dunbar and J A. Beauvais. The combination embraces the tack factories of Dunbar, Hobart & Co., South Abington, Mass; Loring & Parks, Plymouth, Mass.; Taunton (Mass) Tack Co. and the American Tack Co., of Fairhaven, Mass. It is stated that negotiations are pending for the absorption of the Albert Field Co., of Taunton, Mass., and that the company have until May 15 to accept the terms of the Atlas Tack Corporation. The formal action of the American Tack Co. for the sale of their real estate and machinery to the Atlas Tack Corporation took place on April 20, and the formal negotiations on the part of the other companies are understood to be well under way. As these companies represent 60 per cent. of the production in America, it is thought by their managers that by judicious concentration of forces an economy in production may be attained which will be a benefit to the consumer as well. The different factories of the new combination are favorably located within a radius of 25 miles, in two counties of Massachusetts, and this contiguity is in itself a very desirable factor in the management.—[Hardware.

### Wire 1-500th of an Inch in Diameter.

In an interview recently published a wire manufacturer made the following statement: "We are at work just now on some pretty small wire. It is 1-500th of an inch in diameter—finer than the hair on your head, a great deal. Ordinary fine wire is drawn through steel plates, but that wouldn't do for this work, because if the hole wore away ever so little it would make the wire larger, and that would spoil the job. Instead, it is drawn through what is practically a hole in a diamond, to which there is of course no wear. These diamond plates are made by a woman in New York, who has a monopoly of the art in this country. The wire is then run through machinery, which winds it spirally with a layer of silk thread that is .0015 of an inch in thickness—even finer than the wire, you see. This wire is used in making the receiving instruments of ocean cables, the galvanometers used in testing cables and measuring insulation of covered wires."

FOR the National Union Conference at Cincinnati, the rate will be one fare for round trip via the Mt. Vernon & Pan Handle Route, May 18th and 19th.

# INDUSTRIAL SUMMARY.

### New Enterprises:—

The Cable Iron Car Roofing Co., East St. Louis, has filed articles of incorporation; capital, $300,000.

The Improved Perforated Pulley Co., Kansas City, Mo., has been incorporated with a capital stock of $24,000.

The Puget Sound (Wash.) Wire Nail & Steel Co. have organized, with a capital stock of $200,000, for the manufacture of nails and wire.

The Smith-Courtney Co. have been incorporated at Richmond, Va., to have a capital stock of not less than $75,000, nor more than $250,000, to manufacture machinery

It is reported that the Elizabeth Land & Improvement Co., Pittsburgh, Pa., has made a sale to a Chicago firm of 14 acres of ground, on which a safe and lock works will be erected.

At Baltimore, Md, J. J. G. McShane, Edwin Howland, G. H. Rogers and others, have incorporated the Henry McShane Manufacturing Co., to operate the McShane Bell & Iron Foundry.

The Taylor Bros. Iron Works Co., Limited, have been incorporated at New Orleans, La, with a capital stock of $100,000, by W. A., W. R. and J. A. Taylor, proprietors of an iron foundry at that place.

The Wallace & Graves Machine & Foundry Co. have filed articles of incorporation at Lafayette, Ind. The capital stock of the company is $20,000, and they will manufacture steam boilers and castings.

The Southern Farm Tool Co. have been incorporated at Atlanta, Ga., by Thomas Lumpkin, A. M. Hipps and others. The capital stock of the company is $100,000, and the business to be carried on is the manufacture and sale of machinery and agricultural implements.

The Missouri Malleable Iron Co., of St. Louis, Mo., were re-incorporated last month, with a capital stock of $200,000, and the following officers have been elected: Jno. C. Nulsen, president; C. F. Orthwein, vice-president; F. E. Nulsen, secretary; A. J. Nulsen, treasurer, and F. S. Taggart, general manager.

### Additions, Enlargements, Removals, etc.:—

The Davis & Furber Machine Co's. foundry, at North Andover, Mass., is being enlarged.

The Scott Machine & Hardware Co., at Denver, Col., are enlarging premises to double former size, and will put in several new tools.

Lee & Hoff are erecting a new plant, at St. Paul, Minn., for the manufacture of boiler tube expanders, which will be double the capacity of the old plan.

The Ellis & Lessig Steel & Iron Co., Limited, of Pottstown, Pa., have decided to rebuild their plant at that place, and not to remove to Salem, Va., as previously announced by them.

The capital stock of the Ticonderoga Machine Co., Ticonderoga, N. Y., has been increased from $30,000 to $125,000, and an addition is being built to the old machine shop, which will be 144x80 feet. The building will be of brick and equipped with the most modern machinery for the manufacture of mining machinery and gas engines.

J. M. Robins & Co., Nos. 225 to 229 West Second St., Cincinnati, O., manufacturers of special machinery for tinners, roofers and other workers of sheet metals, are erecting a new building in the rear of their place of business to be 70 feet long and 45 feet wide, of iron and brick, and four stories high. When completed, quite a quantity of new machinery will be added to their present equipment. This change is being made to meet the increased demands of their business.

### Fires and Accidents:—

The machine shop of Thomas Findley, at Oswego, N. Y., has been damaged by fire to the extent of $4,000.

Woodruff & Co,'s Machine shop and factory, at Elgin, Ill., were destroyed by fire. The loss is estimated at $10,000.

The copper and sheet iron works of W. A. Case & Son, at Buffalo, N. Y., were burned on April 28, at a loss of $20,000.

The foundry building and contents of the McArthur-Gillmore Foundry Co., at Cleveland, have been burned, at a loss of $15,000.

A fire destroyed W. A. Case & Son's copper and sheet iron works, and C. H. McCutcheon's steamboat supply works and store at Buffalo, N. Y., causing a loss of about $35,000.

### General Industrial Notes:—

The J. L. Haven Co, Cincinnati, O., have the contract for two of their hydraulic passenger elevators to be put in the Carew Block, Cincinnati, O.

J. H. Reedy & Co., Cincinnati, O., have the contract for one of their passenger elevators, to be put in the building No. 23 West Fourth St., where some improvements are being made.

The Fred J. Meyers Manufacturing Co., of Covington, Ky., have the contract for new iron work for the improvements being made on the building No. 23 West Fourth St., Cincinnati, O.

The Cincinnati Corrugating & Iron Roofing Co., of Piqua, O., branch office 91 Johnston Building, Cincinnati, O., have received the contract for their iron lathing for the walls and ceilings of the Carew Block, Cincinnati, O.

The Laidlaw & Dunn Co., Cincinnati, O., have the contract for five of their Duplex steam pumps to be placed in the Carew Block, Cincinnati, O., to be used for the hydraulic elevators to be put in said block by the J. L. Haven Co.

Uhlein, Applegate & Co., 146 West Second St., Cincinnati, O., have received the contract for four 1¼-inch wire ropes 1,150 feet each, and one 1½-inch wire rope 1,1400 feet. This is special power ropes for Mt. Adams & Eden Park Incline Railway Co., of Cincinnati, O., and for 25,000 feet of 17-64-inch galvan-

ized signal wires, to be used on the same company's new electric line. This firm have as well the contract for some 6,000 feet of wire rope, to be used in J. T. Carew's new building, Cincinnati, O.

The Neracher Sprinkler Co have established a Philadelphia office at 925 Chestnut St., with J. F. McElmell in charge. Mr. McElmell is a thorough sprinkler and insurance man, and has since his short connection with the Neracher Co., sent them some valuable contracts.

The "built-up" multicharge cannon is about to be constructed at the Scott Works, at Reading, Pa., for which an allowance of $55,000 has been made out of an appropriation of $100,000 by Congress for the making and testing of multicharge guns. It is calculated to throw a projectile of about 600 pounds weight, with a probable effective range of 12 miles.

## A POINT ABOUT STEEL.

The causes from which trouble may come with steel are innumerable.

The rapid multiplication of small, portable forges is doing much to increase a certain kind of trouble with it, and in fact this particular cause of trouble with steel has assumed proportions of considerable importance, and by pointing out, as we propose to do, some of the limitations of these small forges, we hope to be able to render a service to steel users, steel makers, and to the makers of the forges as well.

Mechanics understand perfectly well that a hammer must bear some proportion to the size and weight of the piece of steel that is to be forged with it; but it is not so generally understood that this is also true of the fire and the forge in which the steel is heated. Of course we do not mean to say that a different size of forge should be used for every variation in weight of work; but we do mean to call attention to the fact that a furnace suitable for heating for a steam hammer is unfitted for tempering small drills and taps, and that a small portable forge is utterly unfitted for heating a steel die weighing 20 pounds or more.

Such forges have their uses, to which they are well adapted, but when a large piece of steel, such as a drop or trimming die, is to be heated for hardening, the conditions necessary to the success of the operation cannot be secured with such a forge. It is well settled that when such a piece of work is to be heated there must be a good body of clean fire, and that a considerable bed of the fuel must be below the work, between it and the tuyere openings. Then the character and distribution of the blast must be such as to keep this body of fuel at a nearly even temperature, and while its volume may be large, it must not be fierce and sharp, but mild and gentle.

Just the opposite of these conditions are present with a small portable forge. No large body of fuel can be heated evenly upon it; the blast coming from a few small tuyere openings, closely grouped together, must be sharp in order to get sufficient heat, and the result if an effect similar to that of a blow pipe, with intense surface and local heating, instead of the evenly distributed low heat absolutely essential to success in hardening such work. Then, too often, when the work cracks to pieces in quenching, the steel maker is blamed.

Of course there is little of this particular kind of trouble in the large shops, for in them regular forges are always found, and it is to the owners of the small shops, particularly where "rooms with power" are hired for manufacturing purposes, that this is addressed, in the hope that it may show some one a cause of trouble with steel not previously suspected.

Such small forges as we refer to are excellent for the class of work for which they are intended, and small tools can be hardened with them as well as with any other forge, especially if charcoal is the fuel used; but it should be recognized that they, like most other things, have their limitations. It should be remembered, too, that pure soft water is a good, if not the best quenching liquid, and that water in which more or less washing of hands with soap has been done is not pure water. The water and the tub containing it should be clean.—[American Machinist.

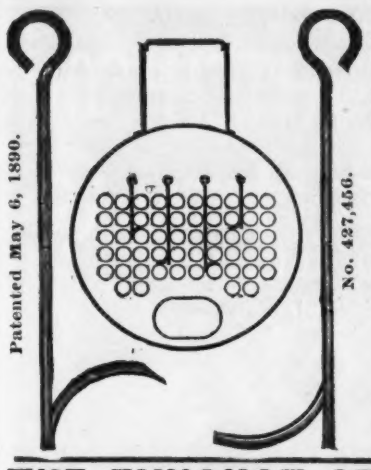
## How to Draw Nails or Spikes.

When a nail or spike has been driven into a live tree, or into timber, after a year or more the fibers of the wood will have contracted so tightly about the metal that it will be exceedingly difficult to withdraw the iron. But, strike a nail or spike a sharp blow with a hammer, and drive it in a trifle so as to break the wood fibers around the metal, and a nail can be withdrawn with only a little force. Iron gate hinges are frequently driven into a living tree. When one is not in possession of a strong claw bar, bore a hole close to the hinge on the under side, and the hinge can be easily crowded down into the hole and withdrawn. When a large nail has been driven head and all beyond the surface of the timber, bore a hole close to the nail, and with a nail set crowd the nail into the hole. When nails have become rusty, they will usually break in two, leaving a portion of the iron in the timber. But, strike a rusty nail a sharp blow, and one can sometimes withdraw it with his fingers. In tearing down an old building, if it is desirable to take off the boards or casings without splitting them, place a nail set on the head of each nail, and with a hammer start it inward about the eighth of an inch. One blow will break the hold of the nail so that most of the nails will come out when the boards are driven off.—[World's Progress.

## Mt. Vernon & Pan Handle Route.

Excursions to Cincinnati; one fare for round trip May 18th and 19th, via the Mt. Vernon & Pan Handle Route, for the National Union Conference. Tickets will be good returning until May 22d. For particulars apply to C. L. Kimball, Ass't Gen. Pass. Ag't, 155 St. Clair St., Cleveland, O.

A FIRE occuring in the Gunn Folding Bed Co.'s factory in Grand Rapids, Mich. on May 3rd was promptly extinguished by a Neracher sprinkler with very little damage. No claim for Insurance.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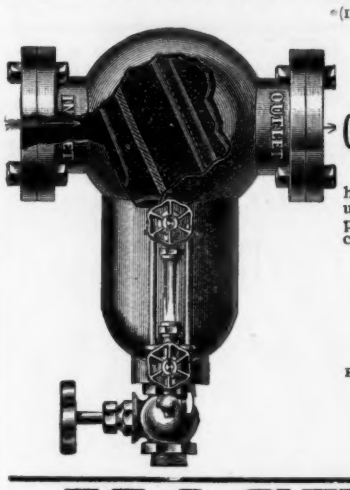


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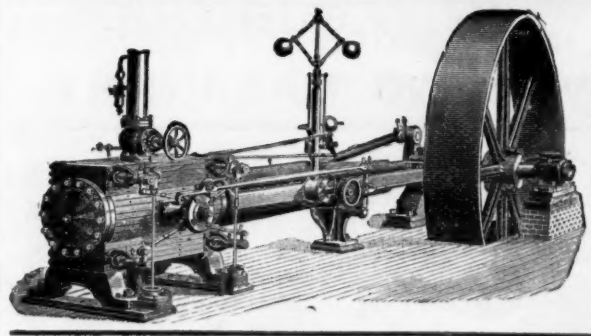

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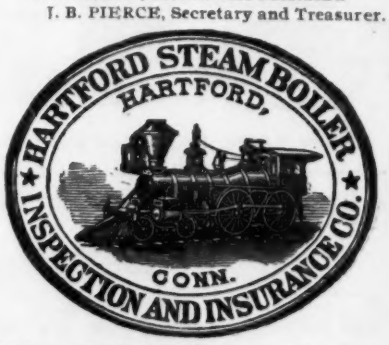


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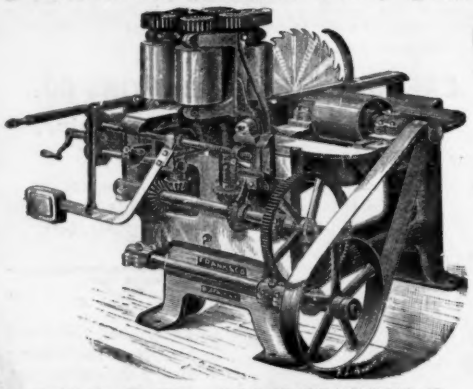

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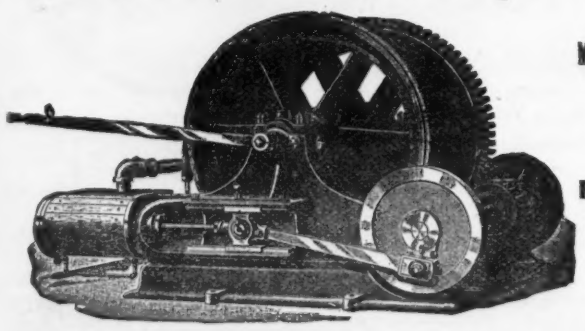

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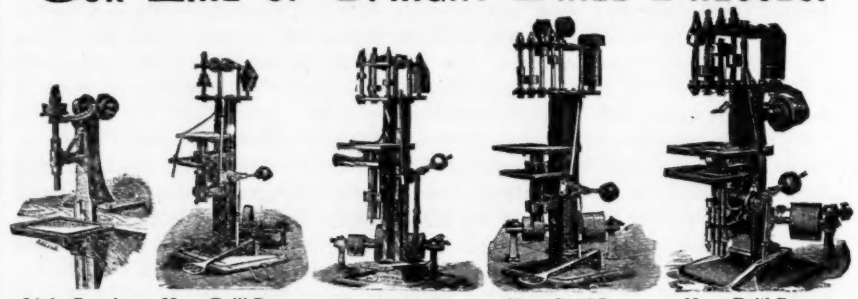

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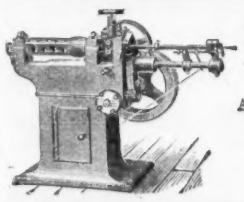

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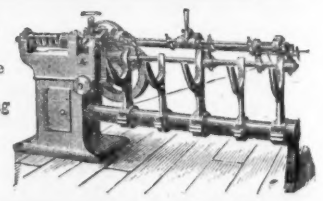

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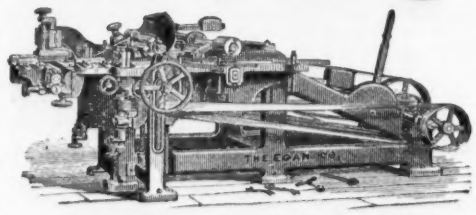

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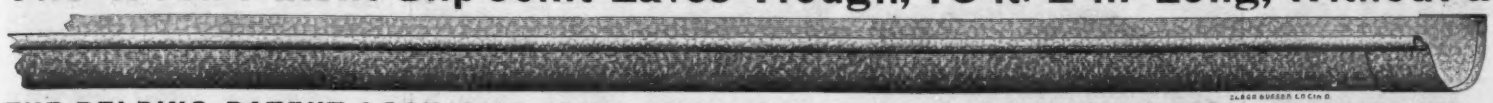

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CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1. foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 75@16 50; Southern Coke No. 3 Foundry, $15 25@16 00; Southern Coke No 1, Softeners, $15 75@16 50; Southern Coke No. 2, Softeners, $14 75@15 50; Ohio Silveries No. 1, $18 00@18 75; Ohio Silveries No. 2, $17 00@ 17 75; Ohio Strong Softeners No. 1, $18 25@19 50; Ohio Strong Softeners No. 2, $17 50@18 75; Lake Superior Charcoal Nos. 1 to 6, $18 00@19 00; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 50@18 50; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 00@13 50; Standard Southern Coke, mottled, $12 50@12 75; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $20 00@20 50; Tennessee Car Wheel, $18 50@19 50; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co): Mahoning and Shenango Valley strong, No. 1 Foundry, $.7 00@00 00; Mahoning and Shenango Valley strong, No 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $ 7 00@00 00; Ohio Softener No. 2, $ 6 00@00 00; Jackson Co., Silvery No 1, $.8 25@00 00; Jackson Co. Silvery, No. 2, $17 25@00 00; Lake Superior Charcoal, $18 50@00 00; Tennessee Charcoal, $18 50@00 00; Southern Softener No. 1, $16 50@00 00; Southern Softener No. 2, $15 50@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00' Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 50@2 5'; Southern (other brands), $17 50@18 00; Lake Superior, $20 50@21 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 75@15 00; Southern Coke No. 7, $ 4 00@14 25; Southern Grey Forge, $13 50@13 75; Southern Charcoal No. 1, $17 75@18 00; Southern Charcoal No. 2, $17 25@17 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $18 50@19 00; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine charcoal), $23 50@24 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 50; Southern No. 1 $ 6 25@16 75; Southern Gray Forge, $14 75@15 25. Jackson County (Ohio) Silvery, $18 25@18 75; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0 00.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 50@15 00 Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75: Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $17 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 25@16 50; No. 2 Foundry, $15 25@15 50; Grey Forge, $14 25@14 50; White and Mottled, $13 25@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal, $22 00@27 00; Bessemer, $17 00@17 50.

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|---|---|
| 1½ to 4 by ⅛ to 1 inch | 1 80 |
| 4½ to 6 by ⅛ to 1 inch | 1 90 |
| 1½ to 6 by 1⅛ to 2 inch | 2 20 |
| 1¼ & 1⅜ by ⅛ to ¼ inch | 1 90 |
| 1 & 1⅛ by ⅛ to ¼ inch | 2 00 |
| ⅛, ¼ and ⅜ by ⅛ to ½ inch | 2 20 |

**Round and Square.**

| | |
|---|---|
| 1 to 1⅜ inch | 1 80 |
| 2 to 2¾ inch | 2 00 |
| 2⅞ to 3¼ inch | 2 20 |
| 3⅜ to 4 inch | 2 80 |
| 4⅛ to 4½ inch | 3 30 |
| 4⅝ to 5 inch | 3 50 |

**Oval.**

| | |
|---|---|
| ⅜ to 1¼ inch | 2 20 |
| ⅜ to ¾ inch | 2 40 |
| ½ | 2 60 |
| ¾ | 3 00 |

**Half Oval and Half Round.**

| | |
|---|---|
| 1⅜ to 3 inch | 2 90 |
| ⅜ to 1¼ inch | 2 50 |
| ⅜ to ¾ inch | 3 10 |
| ⅝ | 3 30 |
| ¾ | 4 80 |

**Heavy Band.**

| | |
|---|---|
| ⅛ to 6 by ¼ and 5-16 inch | 2 00 |
| ⅛ to 1⅜ by ¼ and 5-16 inch | 2 10 |
| ⅛ to ⅜ by ¼ and 5-16 inch | 2 30 |
| [illegible] | 3 80 |

**Hoops.**

| | |
|---|---|
| 1¼ to 4, Nos. 13 to 15 | 2 60 |
| 1¼ to 2, Nos. 16 to 18 | 2 70 |
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| 1¼ to 2, No. 20 | 2 90 |
| 1¼ to 2, No. 21 | 3 00 |
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| 15-16, 1 and 1⅛, Nos. 16 to 18 | 2 90 |
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| ⅞, Nos. 13 to 15 | 3 00 |
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| ⅞, Nos. 19 and 20 | 3 20 |
| ⅞, No. 21 | 3 30 |
| ⅞, No. 22 | 3 40 |
| 13-16, Nos. 13 to 15 | 3 20 |
| 13-16, Nos. 16 to 18 | 3 30 |
| 13-16, Nos. 19 and 20 | 3 40 |
| 13-16, No. 21 | 3 50 |
| 13-16, No. 22 | 3 60 |
| ¾, Nos. 13 to 15 | 3 30 |
| ¾, Nos. 16 to 18 | 3 50 |
| ¾, Nos. 19 and 20 | 3 60 |
| ¾, No. 21 | 3 70 |
| ¾, No. 22 | 3 80 |
| 11-16, Nos. 13 to 15 | 3 50 |
| 11-16, Nos. 16 to 18 | 3 70 |
| 11-16, Nos. 19 and 20 | 3 80 |
| 11-16, No. 21 | 3 90 |
| 11-16, No. 22 | 4 00 |
| ⅝, Nos. 13 to 15 | 3 80 |
| ⅝, Nos. 16 to 18 | 4 00 |
| ⅝, Nos. 19 and 20 | 4 10 |
| ⅝, No. 21 | 4 20 |
| ⅝, No. 22 | 4 30 |
| ⅝, No. 23 | 4 50 |

**Light Band.**

| | |
|---|---|
| 1⅜ to 6 by ⅛ to 3-16 in | 2 20 |
| 1⅜ to 6 by Nos. 11 and 12 | 2 30 |
| 1 to 1⅜ by ⅛ to 3-16 in | 2 40 |
| 1 to 1⅜ by Nos. 11 and 12 | 2 50 |
| ⅞ and 13-16 by ⅛ to 3-16 in | 2 70 |
| ⅞ and 13-16 by Nos. 11 and 12 | 2 80 |
| ¾ and 11-16 by ⅛ to 3-16 in | 3 00 |
| ¾ and 11-16 by Nos. 11 and 12 | 3 10 |
| ⅝ and 9-16 by ⅛ to 3-16 in. | 3 30 |
| ⅝ and 9-16 by Nos. 11 and 12 | 3 40 |
| ½ by ⅜ to 3-16 in | 3 60 |
| ½ by Nos. 11 and 12 | 3 70 |

**Wagon Box Iron.**

| | |
|---|---|
| ⅜ inch, beveled edge, by Nos. 11 and 12 | 2 80 |
| ⅜ inch, " " " 13 and 14 | 3 00 |
| ½ inch, " " " 11 and 12 | 3 10 |
| ½ inch, " " " 13 and 14 | 3 30 |

**Sheet Iron:**

| | |
|---|---|
| No. 10 to 14 | 2 65 |
| No. 15 to 17 | 2 75 |
| No. 18 to 21 | 2 99 |
| No. 22 to 24 | 3 15 |
| No. 25 to 26 | 3 30 |
| No. 27 | 3 40 |
| No. 28 | 3 50 |

**Iron Boiler Plates.**

| | |
|---|---|
| Tank, ¼ inch and heavier | 2 60 |
| C No. 1, " " | 2 85 |
| C H No. 1 " " | 3 10 |
| C H Flange, " " | 3 85 |
| Extra Flange, " | 4 35 |
| Solid Fire Box " | 5 10 |

**Steel Boiler Plates—1-4 in. and Heavier.**

| | |
|---|---|
| Tank | 2 75 |
| Shell | 3 15 |
| Flange | 3 45 |
| Marine Flange | 3 85 |
| Fire Box | 4 55 |

Above includes plates 90 inches wide.

| | |
|---|---|
| 90 to 96 in. wide | ¼c lb extra |
| 96 to 100 in. wide | 1 c " |
| 100 to 104 in. wide | 1¼c " |
| 104 to 116 in. wide | special |

**American Cast Tool Steel.**

| ROUND, SQUARE AND OCTAGON. | cts. lbs |
|---|---|
| 1 to 2 in. inclusive | 09 |
| 9-16 to ⅞ in " | 09 |
| 7-16 to ⅝ and 2⅛ to 3 in | 10½ |
| 3⅛ to 4 in | 11 |
| ⅝ to 11-16 and 4⅛ | 10½ |
| ⅛ to 6 in | 11½ |
| ¼ to 9-32 and 6⅛ to 7 in | 12 |
| 3-6 in | 14 |

**Flats.**

| | cts. lbs |
|---|---|
| 2 to 9-16 wide by 2 to ⅝ thick | 9 |

**Bessemer and O. H. Steel.**

| | | |
|---|---|---|
| Machinery | base price, | 2 75 |
| Tire | " | 2 75 |
| Spring | " | 3 25 |
| Sleigh Shoe | " | 2 75 |
| Toe Calk | " | 3 00 |
| Cutter Shoes, tapered and burr. | " | 3 00 |

**English Tool Steel.**

| | |
|---|---|
| Jessop's | 16c |
| Hobson's "Best" | 16c |
| " "Choice" | 16c |

**Burden Boiler Rivets.**

| | |
|---|---|
| ⅛, ⅜, 11-16 and ½ inches diameter | 4 00 |
| Bridge ⅛, ⅜, 11-16 and ½ inch diam | 4 00 |

## SCRAP IRON AND OLD METAL.

| | NET TONS |
|---|---|
| No. 1 R. R. wrought scrap | $19 00 |
| No. 1 wrought scrap | 17 00 |
| No. 1 Machine cast scrap | 12 00 |
| Iron axles | 24 00 |
| Axle turnings | 13 50 |
| Wrought turning (free from cast) | 12 00 |
| Cast borings | 8 00 |
| Uncut wrought iron boilers | 11 00 |
| Steel boiler plates | 17 00 |
| Grate Bars | 8 00 |
| Pipes and flues (Clean) | 13 50 |
| Tank iron | 13 50 |
| Hoop and band iron | 10 00 |
| Sheet iron | 9 50 |
| Wrought drillings | 11 00 |
| Malleable iron | 10 00 |

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

| | |
|---|---|
| Railroad Wrought | $20 00 |
| No. 1 Country Wrought | 17 00 |
| Stove Plate | 8 75 |
| Machine Castings | 11 00 |
| Hoop and Sheet | 8 00 |
| Casting Borings | 9 00 |
| Wrought Turnings | 10 00 |

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**BESSEMER STEEL RAILS,**

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel. Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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MANUFACTURERS OF

**SHEET IRON AND SHEET STEEL**

Squared Roofing Sheets a Specialty.

CAMBRIDGE REFINED IRON. TRADE MARK

CAPACITY RANGES FROM No. 30 26 INCHES WIDE TO 1-4×40×120

CAMBRIDGE SOFT STEEL. TRADE MARK

CORRESPONDENCE SOLICITED

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**Ball-Norton (Monarch) Electro Magnetic Separator.**

Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

**H. E. COLLINS & CO., Agents Magnetic Separator Co.,**

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Successors to Tuttle, Oglebay & Co.,

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LAKE SUPERIOR AND MENOMINEE RANGE

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Perry-Payne B'ld'g. Cleveland, O.

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**Pig and Bar Iron,**

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AND METALS.

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**Dealers in Iron Ores**

from their own mines near Marquette, Lake Superior.

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CLEVELAND O.

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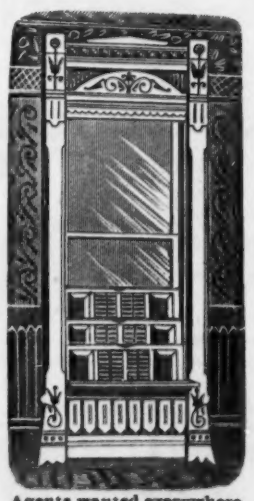

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HARTMAN & DURSTINE, No. 59 Beaver St. Wooster, O.

# MACHINERY SUPPLY MARKET.

### Anvils.

American.....₩ ℔ 9@10
Wrights.....₩ ℔ 12

### Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.... dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

### Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single, .....dis 40
Shults Raw Hide Leather Belting, double, and Light Double.....dis 40
Standard, oak tanned.....dis 50&10
Alexander Brothers' pure oak tanned. ...dis 45

### Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

### Borax.

.....₩ ℔ 12

### Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

### Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 3 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

### Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" Gear Cutters.....dis 15

### Crowbars.

Cast Steel.....₩ ℔ 4
Iron, steel points.....₩ ℔ 3½

### Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
Morse Taper and Straight shank Larger than 1¼".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

### Emery.

| | No. 4 to 46 gr. | No. 54 to 150. gr. | Flour, F. | C. F. FF. |
|---|---|---|---|---|
| Kegs, ₩ ℔ | 4 c | 5 c | | 2½c |
| ¼ kegs ₩ ℔ | 4¼c | 5¼c | | 2¾c |
| ½ kegs ₩ ℔ | 4¾c | 5¾c | | 3 c |
| 10 ℔ cans, 10 in case | 6 c | 6¾c | | 5 c |
| 10 ℔ cans, less than 10 | 10 c | 10 c | | 7½c |

### Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&10

### Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

### Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

### Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 ℔s. 18c over 5 ℔s 14c, new list.

### Jack Screws.

Illinois Bolt Co. list.....dis 70

### Nuts and Washers.

| Size of bolt inches | ¼ | 5-16 | ⅜ | ½ | ⅝ | ¾ | 1 |
|---|---|---|---|---|---|---|---|
| Square | 8 | 7 | 5½ | 4½ | 4 | 3½ | 3¼ |
| Hexagon | 15¾ | 11¾ | 8¾ | 6 | 5¼ | 5¼ | 5 |
| Washers | 9 | 8 | 7 | 5 | 4½ | 4¼ | 4¼ |

In lots less than 100 ℔s, ₩ ℔ add ¾c., 1℔ boxes add 1c to list.

### Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30
{ Less than car lots $2.40

### Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

### Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ ℔ 10@11
Russia Packing " .....₩ ℔ 14
Italian Packing " .....₩ ℔ 13@14
Plumbago Piston.....₩ ℔ 40
Morrison's " .....₩ ℔ 50
Square Flax " .....₩ ℔ 50
Sheet Rubber.....₩ ℔ 12&24
Excelsior Rubber.....₩ ℔ 48

### Picks.

Railroads, 5 to 6 ℔s.....$12 dis 60
" 6 to 7 ℔s.....$13 dis 60

### Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

### Rivets.

Iron, Thousand, list November 17, .....dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

### Rope.

Manilla, ¼ inch and over.....₩ ℔ 15¾
Sisal, ¼ inch and over .....₩ ℔ 13¾

### Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

### Saws.

Disston's Circular.....dis 40@ 1⅘
" Band.....dis 1c
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 33
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

### Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

### Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

### Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2¾ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

### Twine.

| | BC. | B. |
|---|---|---|
| No. 12, Flax Twine, ¼ and ½ ℔ Balls | | ...21c@29c |
| No. 18 " " ¼ and ½ " | | ...18c@28c |
| No. 36 " " ¼ and ½ " | | ...16c@27c |
| 2-Ply Hemp, ¼ & ½ ℔ Balls (Spring Twine) | | 11¾c |
| 3-Ply " 1℔ Balls | | ...12@12¾c |
| 3-Ply " 1½ ℔ Balls | | ...11@11¾c |
| Cotton Wrapping, 5 Balls to ℔ | | ...15@16c |

### Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

### Wire.

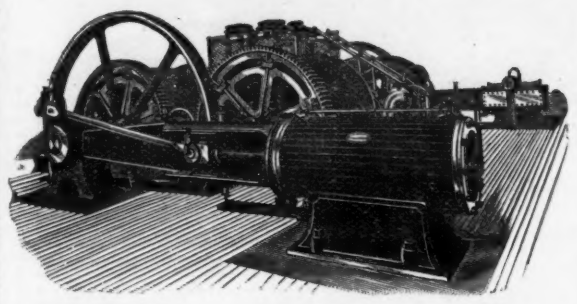
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@℔ dis 5

### Wrenches.

Coe's genuine, .....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50


**Webster, Camp & Lane Machine Co.**



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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

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256-260 DEVONSHIRE STREET, BOSTON.

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**IRON CASTINGS.**

DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS. DUPLICATE WORK A SPECIALTY

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Detachable Roller and Chain Belting.

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For handling materials of all kinds.

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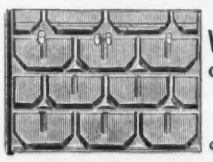

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**THE INDISPENSABLE LATHE DOG.**

THE INDISPENSABLE LATHE DOGS can be attached to work after the work is centered in the lathe. They can be used equally as well BETWEEN COLLARS as upon plain or straight work.

**DROP FORGED FROM BAR STEEL.**

No. 1 takes from ¼ to 1¼ inches, price, each.....$1 50
" 2 " ½ to 2¼ " " ..... 2 50
" 3 " 1 to 3¼ " " ..... 3 50
Price, per set of three, to take from ¼ to 3¼ in. 7 50

**PALMER, CUNNINGHAM & CO., L't'd,**

607 Market St., PHILADELPHIA, PA.

**IRON FOUNDRY** CANTON IRON FOUNDRY CO., Canton, Ohio. HEAVY AND LIGHT CASTINGS. Privilege to make estimates solicited.

THE BRIGHTMAN STOKER IS THE BEST
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SEND FOR DESCRIPTIVE PAMPHLET. THE BRIGHTMAN STOKER Co. 201-203 RIVER ST. CLEVELAND, OHIO.

## HARDWARE MARKET.

### Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

### Axes.

Makers' and Special Brands—
First quality.....₩ doz $8 00
Others.....₩ doz $7 00
Full polished.....₩ doz $9 00

### Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

### Buckets, Elevator.

.....dis 50&10

### Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

### Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

| | Per roll of 500 sq. feet. |
|---|---|
| Eberts Bros., Detroit. | |
| No. 1—Slaters' | $1.25 |
| "A," Stringed Roofing, Light | 1.50 |
| "B," Stringed Roofing, Medium | 1.75 |
| "C," Stringed Roofing, Heavy | 2.00 |
| Stringed, Rosin-Sized | 1.00 |

MILCELLANEOUS.

| | |
|---|---|
| Asphaltum, Trinidad Refined, ₩ ton | $30.00 |
| Asphaltum, Fine Grade, ₩ lb. | .08 |
| Coal Tar Felt, 1 Ply, ₩ lb. | .02 |
| Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft. | 1.42½ |
| Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft. | 1.85 |
| Roofing Pitch, ₩ gal. | .09 |

### Chains.

Revised List.
Trace, 6½-10-2.....₩ pair 1.03
Trace, 6½-10-3.....₩ pair .92 } .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5½@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

### Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

### Cutlery.

Table.....net
Excelsior Pocket.....net

### Fibre Ware—Standard.

| | Nos. 1 | 5. | 5X. |
|---|---|---|---|
| Pails, water, 12 qt. | $4 00 | $4 50 | $..... |
| Dairy, 14 qt. | 4 50 | 5 00 | ..... |
| Fire 12 qt. | 5 00 | ..... | ..... |
| Sugar | 6 00 | 6 50 | ..... |
| Horse | ..... | 5 00 | ..... |
| Buggy | 4 00 | ..... | ..... |
| Chamber, Slop, Commode } 5 and 5X 14 qt. | 6 50 | 7 50 | 8 50 |
| ars. slop, 5 and 5X 14 qt. | 8 00 | 9 00 | 10 00 |
| Basins, wash— | | | |
| 10½ inch | 2 00 | 2 25 | ..... |
| 12 inch | 2 25 | 2 75 | 3 25 |
| 13½ inch | 2 75 | 3 25 | 3 75 |
| 15 inch | 3 25 | 3 75 | 4 25 |
| Bowls, fruit | ..... | 2 50 | ..... |
| Servers, 12 in. | ..... | 2 25 | ..... |
| Baskets, waste paper, 13 in. | ..... | 6 00 | ..... |
| Spittons, "Daisy," pressed 8 inch | 4 00 | 4 50 | 5 00 |
| 10 and 11½ inch | 6 00 | 6 50 | 7 50 |

No. 1 plain; No. 5 decorated; No. 5X White decorated.

### Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

### Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

### Horse Nails.

| | No. 10 | 9 | 8 | 7 | 6 | |
|---|---|---|---|---|---|---|
| Ausable, ₩ lb. | 23 | 24 | 25 | 26 | 28 | dis 40 |
| Putnam, ₩ lb. | 18 | 19 | 20 | 21 | 23 | dis 15 |
| Essex | | | | | | dis 25&10 |

### Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

### Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

### Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

### Plumbs and Leves.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

### Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

### Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

### Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

### Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$[illegible]...dis 10
Rifle razor.....dis $9 50 net

### Rat Killers.

Schuyler's.....₩ gross $15 00

### Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

### Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

### Squares.

Steel and iron, Nickel plated } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

### Tacks, Brads, Etc.

New List, Oct. 19, 1890.
American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 40&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks...dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10

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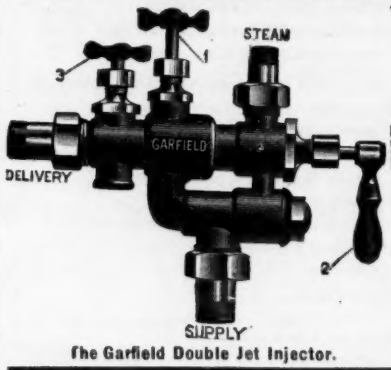

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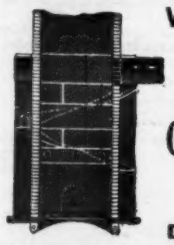

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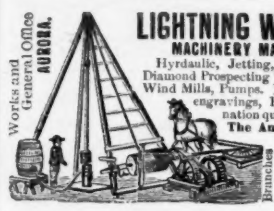


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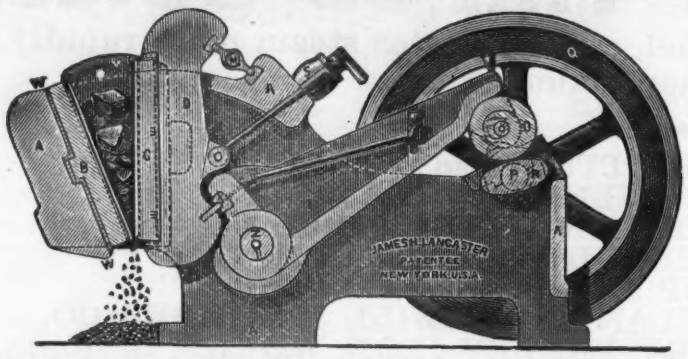


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| Mahoning Accommo..... | | †6 40 a m |
| Pittsburgh Express..... | †6 25 p m | |
| Youngstown Local..... | †8 05 a m | |
| Mahon'g div. & Pitts Local | | *11 40 a m |
| Mahoning Val. Accom..... | | †4 30 p m |
| Pittsburgh Express..... | †1 20 p m | 11 10 p m |
| New York Express..... | *8 00 p m | ..... |

*Daily. †Daily, except Sunday. ‡Daily except Monday.

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(Standard Gauge.)

Depart for—
Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—
Zanesville and Coshocton—10:30 a. m.,6:30 p m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
Trains marked * run daily.

**Valley Railway.**

FOR AKRON, CANTON AND MARIETTA.
Depot oot South Water Street.

| | Depart. | Arrive. |
|---|---|---|
| Valley Junction Mail..... | *7 25 a m | *6 40 p m |
| Marietta Express..... | †11 15 a m | †2 35 p m |
| Balto. & Wash. Express.... | *4 00 p m | *10 25 a m |
| Cleve. and Canton Express | †6 30 p m | †8 15 a m |

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt

From Cleveland Union Station.

## PENNSYLVANIA LINES.

**Cleveland & Pittsburgh R. R.**

| | Depart. | Arrive. |
|---|---|---|
| For Pittsburgh, Baltimore, Washington, Philadelphia and New York. | 7 45 a m | d5 25 a m |
| | 1 15 p m | 12 50 p m |
| | d11 10 p m | 6 35 p m |
| Wheeling and Bellaire. | 7 45 a m | 12 50 p m |
| | 1 15 p m | 6 35 p m |
| | *11 10 p m | ..... |
| Alliance Accom..... | 3 25 p m | 10 10 a m |
| Ravenna Accom..... | 5 00 p m | 8 25 a m |

d Daily. *Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

## Mt Vernon and Pan Handle Route

**Cleveland & Pittsburgh R. R.**

| | Depart. | Arrive. |
|---|---|---|
| For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest. | 8 00 a m | d 7 00 am |
| | d 8 00 p m | 5 40 p m |
| For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus. | 1 15 p m | 12 50 p m |
| For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest. | 8 00 a m | 5 40 p m |
| | 3 25 p m | 10 10 a m |

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|---|---|
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| No. 72, New York & Pitts. Express.... | * 8 10 a m |
| No. 70, Pittsburgh Accom..... | *11 25 a m |
| No. 64, New York & Pitts. Limited... | * 2 50 p m |
| No. 66, Mantua Accommo..... | * 4 20 p m |
| No. 74, Youngst'n Ex..... | † 6 00 p m |
| No. 68, New York & Pitts. Ex..... | *11 00 p m |
| | Arrive. |
| No. 61, N. Y. & Pittsburgh Express... | † 5 15 a m |
| No. 71, Youngstown Accom..... | * 7 15 a m |
| No. 65, New York & Pitts. Lim..... | * 9 55 a m |
| No. 67, Pittsburgh Accom..... | *12 45 p m |
| No. 73, Leavittsburgh Local..... | * 2 10 p m |
| No. 63, New York & Pitts. Ex..... | * 6 50 p m |
| No, 75, Mantua Accom..... | * 7 20 p m |
| No. 69, Youngstown Express..... | † 9 10 p m |

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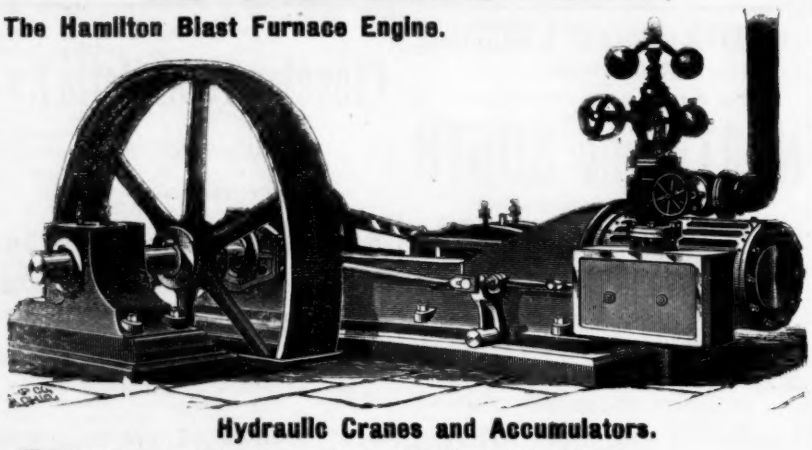

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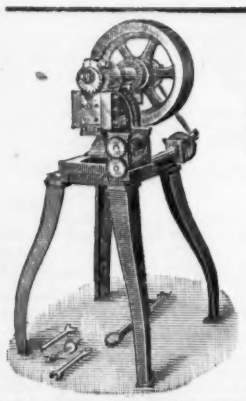

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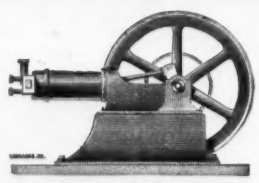

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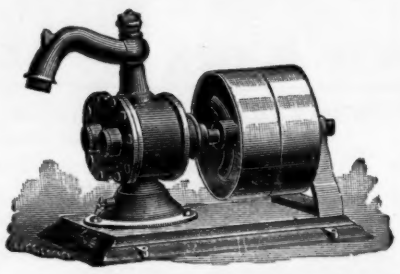

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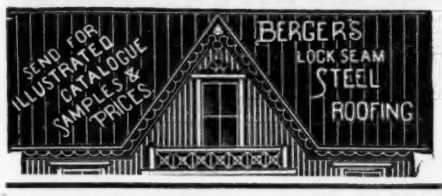


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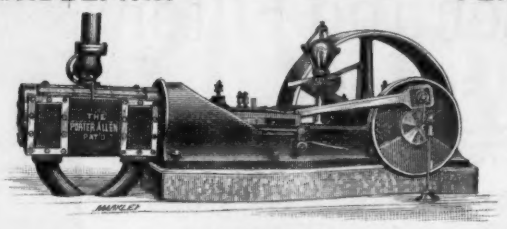

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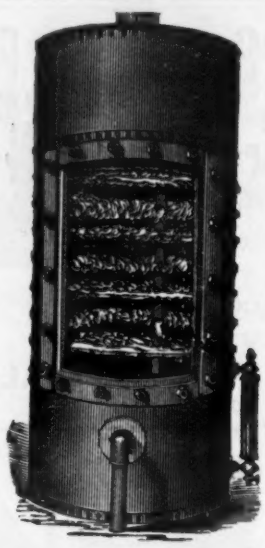

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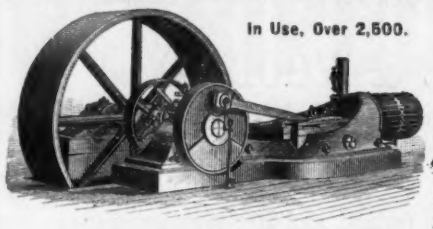

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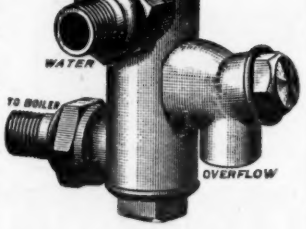

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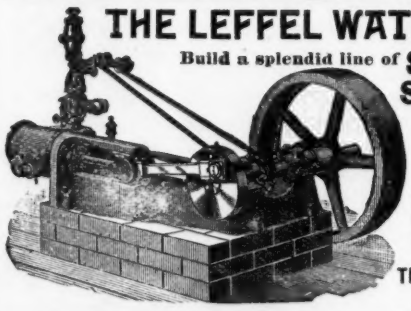

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